FORESTRY ABSTRACTS

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SAP-STAIN OF TIMBER*

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PART II

7. PREVENTION OF SAP-STAIN

In Logs

As soon as a tree is felled, the exposed ends of the logs, and any parts of the sapwood from which the bark has been removed, are immediately exposed to infection by airborne spores of sap-staining fungi. The degree of infection depends on the number of spores in the air; in cold weather there are fewer than in warm weather, and also few or no insects.

The spores cannot germinate so long as the temperature remains below or only a little above freezing point, and growth is very slow at temperatures below 50° F. (10° C.). This means that logs felled during the winter months in northern Europe will not become stained until the following summer, and their conversion can safely be delayed. In warm-temperate regions, however, such as the southern parts of the U.S.A., staining fungi may be active throughout most of the winter and there will be a risk of staining if log conversion is delayed. In the tropics, logs of susceptible species may become deeply infected with sap-staining fungi within a few weeks of felling. This is particularly likely to occur if the timber is susceptible to ambrosia beetles (pinhole borers) which may introduce staining fungi when laying their eggs in the logs.

In order to get uninfected logs to the sawmill, it is necessary either (1) to extract them so rapidly after felling that staining fungi do not have time to become established and penetrate deeply into the wood, or (2) to treat the logs with some fungicide that will inhibit the growth of these fungi until such time as the logs can be sawn up, or (3) to store the logs under water until they can be converted.

Generally the presence of bark affords logs some protection against the entry of stain, and Björkman (1946*a*) recommends that Pine logs should be floated in an unbarked state if they possess adequate buoyancy, but if some degree of drying is necessary to reduce their weight he suggests that they should be spot-barked. Lindgren (1951) found approximately twice as much staining in barked Pine pulpwood as in the unbarked bolts.

Means for minimizing the staining introduced by insects into unbarked Pine logs have been studied by Lekander and Rennerfelt (1955), who found that most of the staining was introduced by *Blastophagus minor* and that attack was much less severe in large loose stacks at depots than in small stacks in the forest, where practically every log was infested. Launching the timber early in the season prevented further insect development, and treatment of the logs with a DDT preparation before the insects swarm was found to give adequate control. Indeed, treatment of logs with fungicidal preparations alone seldom ensures complete freedom from staining over prolonged periods of storage, although it may retard the onset of staining to a worthwhile degree. Since staining fungi are so often introduced by barkbeetles and ambrosia beetles, it is generally necessary to incorporate an insecticide into the spray used for treating the logs, at least during the summer months when the insects are active.

As an insecticide, BHC applied in such amounts that the final concentration of the γ isomer is 0·5% has met with considerable success. As regards fungicides, the most effective so far has been PCP at a concentration of 2–5% in fuel oil. Kramer (1954) reported that Pine and hardwood logs sprayed with BHC and PCP in oil remained free from insect attack in Texas for as long as 6 months and were much less severely stained than untreated control logs. Schulz (1953) found that spraying the ends and bark scrapes of Pine logs with 3% Na PCP reduced, but did not entirely prevent, staining. He

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considered this treatment to be worth while if the logs were really freshly felled, or when felling had to be done during the warmer months of the year.

Scheffer (1958) has emphasized the importance of preventing seasoning checks at the ends of logs, since such checks allow spore infection to penetrate into the logs through the treated ends. A bituminous or asphaltic coating, applied to the ends, should therefore follow the fungicidal spray, if protection during long periods of storage is desired.

Undoubtedly the ideal way to store logs awaiting conversion is to keep them submerged in fresh water. Sap-staining fungi are aerobic organisms which cannot penetrate into wood saturated with moisture. If freshly felled timber can be completely immersed in water it remains free from fungal staining almost indefinitely. Benoit (1954) pointed out the importance of total submersion of logs of susceptible species, quoting an instance of sap-stain developing in 8 days in the exposed parts of a log of Ilomba, which floats high in the water. He suggested that, where possible, logs of heavy species should be rafted together with those of lighter species so as to keep the latter more or less completely submerged. Staining of the exposed parts of floating logs is likely to be more severe if the water is still than if it is agitated by waves. Storage in sea water gives as good protection as fresh water storage but in some parts of the world involves the risk of damage by *Teredo*. The only type of staining that has been observed to develop in logs wholly submerged in the pond at the Princes Risborough Laboratory has been in Beech—a bright orange stain that is presumably caused by bacteria. This type of staining is unlikely to prove troublesome in practice.

When it is not feasible to construct a log pond, piles of stored logs can be protected by spraying them with water so as to keep them saturated. The spraying need not be continuous, provided that the surface of the logs is kept wet. The amount of artificial rain required to achieve this will, of course, depend on the size of the piles and the climate to which they are exposed, 'rainfall' of 6 mm. per hour has been suggested in Sweden.

In mountainous country the water may be taken by flume from a stream and dispersed through nozzles over the piles by the force of gravity; otherwise the water must be pumped and distributed through a type of sprayer used for watering crops, such as the 'Rainmaster'. When this type of protection is given, it will obviously be necessary to build the log piles on a firm foundation of stones or hardcore so that the water can drain away. If suitable drainage to a pond can be contrived, most of the water will be available for re-circulation and its loss need not be excessive.

In Sawn Timber

(*a*) *Good seasoning practices*

If the surface of sawn timber can be dried off sufficiently quickly, no sap-stain can occur, for the spores of sap-stain fungi can germinate and their hyphae penetrate the wood only if its surface remains persistently damp. Good seasoning practices and proper stacking of the sawn timber so that drying can begin with the minimum of delay, will do much to reduce the incidence of staining. The points that have most bearing on the control of sap-stain have been well marshalled in a bulletin by Scheffer and Lindgren (1940) and are summarized as follows:—

(1) It is essential to have good circulation through and round the base of the seasoning stacks, and these should rest on solid foundations well off the ground, which should be free of weed growth.

(2) Each layer of boards or planks should be separated by carefully aligned, narrow, dry stickers which should themselves be free from stain. The depth of the stickers will depend on the kind of wood and the season of the year—for softwoods 1 in. is usual, but for hardwoods ½ in. is more suitable in good drying weather, to prevent too rapid drying out with consequent splitting and checking of the wood.

(3) The stacks of timber should be not more than 6 ft. wide, but they may be built to any height that will remain stable. They should not be too close together, so as to permit a good circulation of air between them. Some form of roof with an overhang of at least 1 ft. at the front and 2½ ft. at the rear should be provided, sloping so as to throw off rain water quickly and built high enough to allow the air to pass freely through the top of the stack.

(4) The seasoning yard itself should be on open, well-drained land, over which air can move freely. It is important to keep the yard clean, tidy and free from offcuts, slabs, sawdust, etc. in which staining fungi and insects can breed.

(*b*) *Chemicals (fungicides) for prevention of sap-stain*

However carefully it is handled, timber may become stained if the weather remains warm and humid after it has been stacked for seasoning. Only when conversion and stacking can be restricted to the

cooler and drier months of the year can staining be entirely avoided. There is, for example, always a risk of sap-staining in Pine sawn during the summer months in England, while under humid tropical conditions staining of susceptible timbers is inevitable unless the wood is kiln-dried off the saw or given suitable fungicidal treatment.

It was not until the beginning of this century that fungicidal treatment of freshly sawn timber was attempted. Chemicals such as Na_2CO_3 and $Na_2B_4O_7$ (borax) that were used in the earlier experiments proved only moderately successful in controlling stain under conditions very favourable for its development. As a result of an intensive study by Hatfield and others at Madison during the early 1930's, of the toxicity to staining fungi of a wide variety of chemicals, potent new fungicides were developed. Organic mercurials based mainly on formulations containing about 5% of ethyl mercury phosphate were among the first of these newer chemicals to be developed commercially. These compounds, marketed under proprietary names such as Lignasan, proved extraordinarily effective in practice against sap-stain, but were found to permit the growth of mercury-tolerant species of *Penicillium* on the treated wood; the growth of *P. cyclopium* appears actually to be stimulated by the presence of an organic mercurial (Verrall 1949). Owing, however, to the highly poisonous nature of such compounds, the search for effective products less toxic to man and animals was continued. The most reliable products so far developed have been the Na salts of highly chlorinated phenols, in particular Na tetrachlorophenate with or without the addition of Na 2-chloro-orthophenylphenate, and Na PCP. The last-named has proved to be the most effective of this group and is now very widely used and sold under proprietary names such as Santobrite, Dowicide G and Xylophène Na.

Solutions of chlorinated phenols are somewhat irritant to the skin and efforts have been made without much success to find alternatives, but the irritating properties of Na PCP can be reduced by adding borax. Borax alone is moderately effective on hardwoods, but according to Verrall (1949) the tolerance of *Alternaria* to borax limits its use on Pine except in admixture with chlorophenates. The concentration of active principle necessary to give complete protection during seasoning depends on a number of factors, such as the species of wood (which will determine in some degree the species of fungi involved), the dimension of the pieces to be treated, and climatic conditions. One can therefore find in the literature a wide range of concentrations recommended—varying for Na PCP from 0·7% to 2·0%. In general, higher concentrations are required to protect tropical hardwoods against *Lasiodiplodia* spp. than coniferous woods under cool temperate conditions. Thick material that takes longer to dry requires higher concentrations than thinner material that will dry off quickly. Mixtures of fungicides can often be employed with advantage when species of moulds that are highly tolerant to particular chemicals become troublesome. It is usually more economical to use a mixture of fungicides than to increase unduly the concentration of a single chemical. Concentrations of sap-stain preventives are generally expressed as lb. of commercial product/100 gal. water.

Standard concentrations most usually recommended are as follows:—

Chemical	*lb./100 gal. water*
Na PCP	for average conditions .. .. 7–10 for severe tropical conditions .. 20
Na PCP 1 part Borax 3 parts	for temperate conditions 20
Na PCP 1 part Borax 2 parts	for tropical conditions 30
Na PCP 3 parts Borax 10 parts Organic mercurial (as sold) 1½ parts	.. 10 to 14

Earlier work on the control of staining fungi on sawn timber during seasoning was summarized by Verrall (1945). Zabel and Foster (1949) studied the effectiveness on White Pine lumber of many of the well known sap-stain preventives and concluded that it was unwise to use any appreciably lower concentrations than those recommended by the manufacturers. A comprehensive survey of research work on the control of staining fungi by means of chemical dips was made by Verrall and Mook (1951). The use of chemicals to inhibit staining due to the action of oxidizing enzymes on polyphenols present in the wood has been suggested by Gadd and Wartiovaara (1954) who found NaN_3 to be the most effective of the substances they tested; it also inhibited the growth of moulds. Unfortunately this is a highly poisonous chemical.

(i) *Methods of treatment*

In order to ensure effective protection against sap-stain, it is essential that all surfaces of the timber should be thoroughly wetted by the fungicide. Deep penetration of the chemical solution is not necessary. The most efficient treatment is to immerse the timber momentarily in a bath of the fungicide. In small mills the boards can be dipped by hand in a deep, long, narrow (say 18 × 18 in. × 20 ft.) tank or trough made either of metal or of 2-in. wooden planking bolted together and caulked. When the boards are withdrawn from the tank, they should be placed on a draining board so that the excess of solution drains back into the tank. With most of the chlorinated phenols, operatives handling the wet timber should be provided with stout rubber gloves and aprons and cautioned to avoid splashing the fluid on to the eyes or face. When using any fungicidal chemicals, the manufacturers' safety recommendations should be carefully followed.

Larger mills now dip the timber mechanically, the boards being carried by live chains from the edger or trim saw through a V-shaped tank in which they are kept submerged, and thence up an inclined draining board. Designs for suitable dipping vats can be obtained from the manufacturers of sap-stain preventives. The exact lay-out will, of course, have to be tailored to the quantity and sizes of the lumber that is to be treated. If it is wished to treat large pieces that cannot easily be dipped, the baulks should be passed through a hooded spray chamber in which they are exposed to jets of fluid from all four sides—the fluid that drains off the timber dripping into a sump from which it is re-circulated by a pump through the spray nozzles. It is important that the sawn timber should be brushed quite free from sawdust, as this absorbs some of the fungicide and may also find its way into the nozzles and block them. It is, customary to use rather stronger solutions for sprays than for dips.

After the timber has been dipped, it should be stacked to season in the ordinary way. However, no harm will follow if there is a delay of a few days, or even one or two weeks, in stacking the treated timber: it has in fact been shown that Fir, Spruce and Hemlock dipped in an anti-stain solution did not suffer serious deterioration when bulk-stacked for 12 months in a green unseasoned condition.

Causes of failure

The most usual cause is the presence of traces of infection in the logs at the time of conversion; if boards contain hyphae of staining fungi when they are dipped, internal stain may develop subsequently, even though the surface remains clean. Another cause is exposure of the treated timber to heavy rain, which may dilute the chemicals to such a degree that stain can develop. A third is failure to main the concentration of the dip at the correct level. Verrall and Mook (1950) have shown that the fungicidal solutions used for stain control become less effective after repeated use, presumably owing to the adsorption of the toxic solutes on the wood. This occurs most noticeably with organic mercurials. These authors concluded that adequate strengths can be maintained if additions of recommended concentrations are made before the solution level in the treating vat drops below 80% of the original volume. Finally, undue delay in stacking the timber to season after dipping may result in some staining. In recent years, much Douglas Fir in a green unseasoned state has been shipped to the U.K. from the West coast of America, and some of this has arrived in a badly stained condition, though it is all supposed to have been dipped. The cause of these failures is not yet clear, but the obvious conclusion is that it is preferable to season timber for export, at least partially, even if it has been dipped.

(ii) *Cost of dipping treatments*

The chemicals used for making up the anti-stain solutions are relatively cheap and the cost per gallon in this country should not exceed about threepence. If there are proper arrangements for collecting the excess of solution that drips off the treated boards, about 15 gallons of solution should be required to treat 1000 bd. ft. of 1-in. boards. When dipping is done by hand, rather more solution is used than when it is done mechanically, because there tends to be more splashing, and arrangements for draining are not generally so good. The absorption is greater on rough sawn than on smooth sawn timber.

Labour costs involved in hand dipping will of course depend greatly on the organization and lay-out of the mill. It has been estimated that the cost of labour to dip 1000 bd. ft. may be about $\frac{1}{10}$ to $\frac{1}{8}$ of a day's wages. For W. Germany, Schulz (1953) estimated the cost of treating 1 cu.m. of sawn timber to be not more than 5 DM. Estimates of the cost of treating logs in the U.S.A. have been given by Scheffer (1958), who states that about 2 gallons of solution are needed to treat 100 sq. ft. of surface.

(iii) *Methods of evaluating anti-stain chemicals*

The preliminary assessment of toxicity to sap-staining organisms of new chemicals is generally made by means of the so-called agar or Petri-dish tests, in which a series of concentrations of the chemical

in malt agar is prepared and then inoculated with transplants from a culture of a test fungus. The minimum concentration required to inhibit the growth of the fungus is commonly referred to as the toxic limit. Compounds found to exhibit a high toxicity to sap-staining fungi *in vitro* must then undergo further tests to determine their effectiveness on wood. In order to get vigorous growth of staining fungi on samples of sapwood, the wood must have a suitable moisture content and must contain adequate amounts of the nutritive cell-contents for the nourishment of the fungus. Freshly felled timber is to be preferred, but if it is not regularly available the sapwood should be cut up immediately after the tree has been felled, and dried off quickly. Schulz (1951) has shown that the susceptibility of sapwood kiln-dried immediately after conversion can be increased so as to make it equal to that of freshly felled wood by impregnating it with a 1% solution of malt extract before use.

Hatfield *et al.* (1950) described a convenient way of preparing test pieces for laboratory investigations, viz. to cut cross-sections from young Pine stems about $\frac{3}{4}$ in. (2·0 cm.) thick, and punch out discs with a sharp-edged hollow steel punch about $2\frac{1}{2}$ in. (6·4 cm.) in diameter. These are dipped in the anti-stain solutions, sprayed with a suspension of the spores of staining fungi, and then stacked in a closed glass vessel alternately with untreated controls, from which they should be separated (e.g. by glass rods used as stickers), and the whole is kept at about 25° C. The untreated discs should become heavily stained in 3–4 weeks.

A method for estimating quantitatively the amount of blue stain in test pieces was suggested by Rennerfelt (1945), who measured the brightness of briquettes made with a colourless glue from sawdust prepared from the test pieces. Using a reflection meter or brightness tester, he compared the brightness of these briquettes with a standard set prepared by the addition of charcoal to wood flour.

A rapid laboratory method for evaluating chemicals for the control of sap-stain has been described by Lohwag (1957). He suggests that strips $10 \times 5 \times 0{\cdot}9$ cm. should be cut from fresh, naturally stained boards and that the test chemical be brushed over a 3·5-cm.-wide zone, delineated with a saw kerf in the centre of the strips. The treated strips are then kept in a saturated atmosphere for up to 3 weeks, and the presence or absence of growth on the treated zone is noted.

Pilot-scale tests may be carried out by building miniature stacks of small boards cut from freshly felled trees. The various treatments should be dispersed through the stack in a random way or else aligned vertically, so as to equalize any differences that may exist in conditions between the top and the bottom of the stack. Some of the problems involved in the selection of test pieces and in their random distribution within experimental stacks have been discussed by Verrall and Mook (1951). Each layer should be separated by stickers and the stack should have untreated material at the bottom, top and sides. Unless the weather is very favourable for the development of staining fungi, the stack should be covered with a tarpaulin at least on three sides for about two weeks, so as to reduce the rate of surface drying and give the fungi a chance to become established. If the weather is cold, experimental stacks should be erected in a heated building. To ensure adequate and uniform infection of all the boards, each layer should be lightly sprayed with a suspension in water of the spores of the staining fungi. The concentration of anti-stain chemical that is required to protect the boards in such a test may well be somewhat higher than that subsequently found necessary in practice when normal air-seasoning practice is followed. Field trials with full-scale stacks of timber in commercial sizes should, of course, eventually be carried out in the actual area where the timber is to be stacked for seasoning.

8. ECONOMIC SIGNIFICANCE OF SAP-STAIN

Architects are always disinclined to use stained timber in buildings, and it is widely, though mistakenly, believed that sap-stain is either the first stage of decay or predisposes timber to dry rot. In consequence, clerks of works often reject stained timber for building purposes even though it may be perfectly suitable in all other respects. Stained timber is not acceptable to manufacturers of packing cases for foodstuffs, soap and drinks. With the present-day preference for furniture having a natural pale finish, the presence of staining is often objectionable on the grounds of appearance, and in furniture and joinery wood such as Ramin or Obeche it greatly lowers their value. For these reasons a timber merchant may find it difficult to obtain the normal market price for any parcel of wood that contains a high % of stained pieces. The importer is therefore likely to make a claim against a shipper who has sent a consignment of wood that arrives in this country in a stained or mouldy condition, even though the wood is still perfectly sound and free from decay. To avoid the possibility of such claims, shippers of susceptible woods are applying anti-stain treatment on an ever-increasing scale and find that it pays them to do so. In general, these treatments have proved to be effective when the timber receives a certain amount of seasoning before it is shipped, but cargoes of softwood shipped through the Panama Canal in a completely unseasoned green condition are sometimes found to be severely stained, even

though they are reported to have been dipped. It is probable that somewhat higher concentrations of chemicals are needed effectively to protect green timber that is to remain bulk stacked for many months, than for timber that is to be air-dried without delay after dipping.

It is much easier to prevent sap-stain then to remove the evidences of it. Fungal stains are on the whole resistant to bleaches. Sap-stains may be reduced in intensity by bleaching agents based on H_2O_2 or by hypochlorites, though neither of these agents will generally remove the stains completely. In some instances hypochlorites may be preferable because they cause less bleaching of the unstained wood and are therefore more effective than H_2O_2 in reducing the contrast between stained and unstained wood. A method patented by Orth (1950) in Austria involves treating stained Fir, Beech, Maple or Oak with 15% NaOH or KOH at ordinary temperatures so as to swell the surface of the wood, then treating with H_2O_2 solution, and finally washing off the chemicals with water.

One of the difficulties that arises when using any bleaching agent is that the latter usually tends to raise the grain of the wood, so that further sanding becomes necessary, and this in its turn removes the bleached surface and again exposes the stained wood beneath.

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(*The previous part of the above article appeared in F.A.* 20 (1). *Reprints of the whole article are available from* Central Sales Branch, Commonwealth Agricultural Bureaux, Farnham Royal, Bucks., England, at 3s. 6d. *each, post free*).

ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

Translations

See Nos. 1880, 2156, 2346–7, 2376, 2392, 2431, 2465, 2520, 2556, 2565.

0 (048.1). Bibliographical Lists

See Nos. 1404, 1453, 1678, 1865, 2231, 2251, 2398, 2451, 2518.

0 (05). Periodicals. Yearbooks. Directories. Almanacs, Calendars, Diaries

1343. ***Boletín del Servicio de Plagas Forestales***. Dirección General de Montes, Caza y Pesca Fluvial, Ministerio de Agricultura, Madrid.

A bulletin, to be issued at irregular intervals, reporting on the more important events in the work of the Pest Control Service. Vol. 1, No. 1, issued in 1958, contains some 53 pages. Citation in *F.A.*: *Bol. Serv. Plagas for., Madrid.*

0 (084.3/.4). Maps. Atlases

1344. Weltforstatlas. **[World forestry atlas [part].]** Fritz Haller Verlag, Berlin. 1956.

[Cf. *F.A.* 18 No. 2398.] Four further sheets, as follows:—*Spain and Portugal* (% forest area; forest distribution; % coniferous and broadleaved forest; distribution of wood species—*Pinus*, *Quercus suber*, *Q. ilex*; forest area according to ownership; afforestation of waste land). *Soviet Russia* (2 sheets: (*a*) distribution of the most important species; (*b*) position of the woodworking industries; land utilization—forestry, agriculture, hunting, grazing; cut in % of the possibility). *Tropical central Africa* (forest distribution; position of the woodworking industries; timber trade).

1345. **[Map of] Kenya—political and general. [North and South.]** Survey of Kenya, Nairobi. No. *SK* 8 (2nd ed.) 1957. 2 sheets. Scale 1: 1,000,000.

Shows Crown and native forest areas, Royal and national parks and reserves, alienated land, and native land units, leasehold areas, reserves, and settlement areas, etc.

1346. **[Maps of the State indigenous and exotic forests of New Zealand. (1) North Island. (2) South Island.]** Lands & Survey Department, Wellington. 1954. Two sheets. Scale 1:2,000,000.

0 - - 011. Terminology. Nomenclature

See No. 1356.

1. FACTORS OF THE ENVIRONMENT. BIOLOGY

11. Site Factors: Climate, Situation, Soil, Hydrology (Water Conservation, Soil Conservation and Erosion)

111. The Atmosphere. Meteorology. Climate and Microclimate

111.2. Radiation and Temperature

See also No. 1809.

1347. ROUSSEL, L. Petite chronique de photologie forestière. **[A short review of studies of light in the forest.]** *Rev. for. franç.* 10 (11), 1958 (709–17). 22 refs. [F.]

A further review of some recent European literature. [Cf. *F.A.* 18 No. 6.]

1348. CHAPMAN, J. A. **A device for visualizing the pattern of plane polarized light from blue sky.** *Nature, Lond.* 181 (4620), 1958 (1393–4). 4 refs.

The direction of certain flights of *Melolontha melolontha* appears to be influenced by the pattern of polarized sky light. As a result of considering the possibility of a similar mechanism in the flight organization of Scolytidae, a method has been devised by which the human eye can 'see' the polarization pattern in much of the blue sky. This consists in observing the sky through a rotating 'Polaroid'-covered slit, the construction and use of which are described. It enables the human eye to detect aspects of light that are apparently perceived by arthropod eyes.

111.7. Humidity, Evaporation. Clouds etc. Precipitation

See also Nos. 1357, 1388–91, 1938–9.

1349. MCCULLOCH, J. S. G. **Rainfall measurement.** *Rep. E. Afr. Agric. For. Res. Organ. 1957*, 1958 (11).

In order to avoid extensive rain-gauge clearings in the control catchments at Fort Essex, Kenya, gauges have been mounted at the level of the Bamboo canopy, by lopping off suitable Podocarps, and building platforms 40–60 ft. above the ground. This followed experimental work at Muguga, where it was found possible to use a standard rain-gauge funnel mounted on the platform, with a ¼-in. P.V.C. tube to lead the rain down to a collecting bottle on the ground below. This saves the observers from climbing the trees daily.

1350. BAUMGARTNER, A. Die Regenmengen als Standortsfaktor am Grossen Falkenstein (Bayer. Wald). **[Rain as a site factor on the Grosser Falkenstein (Bavarian Forest).]** *Forstwiss. Cbl.* 77 (7/8), 1958 (230–7). 10 refs. [G.]

Gives details of the rainfall on the mountain [cf. *F.A.* 18 No. 3811] from measurements made in 1954

and 1955 as part of a general site-climatological investigation, further reports of which are to be published.

1351. BAUMGARTNER, A. Nebel und Nebelniederschlag als Standortsfaktoren am Grossen Falkenstein (Bayerischer Wald). **[Mist and mist precipitation as site factors on the Grosser Falkenstein (Bavarian Forest).]** *Forstwiss. Cbl.* 77 (9/10), 1958 (257–72). 22 refs. [G.]

Gives details of the duration, amounts and distribution of mist on this mountain in 1954 and 1955. On the summit (1308 m. alt.) and higher slopes, mist provides a considerable amount of water and is an important site factor, but plays only a small rôle in the water regime of the mountain as a whole.

111.8. Climatology. Climate and Microclimate

See also Nos. 1359, 1528, 1592, 1597, 1615–6, 1623, 1842.

1352. BAGNOULS, F., and GAUSSEN, H. Les climats biologiques et leur classification. **[Biological climates and their classification.]** *Repr.* from *Annales de Géographie, Paris* 66 (355), 1957 (193–220). 10 refs. [F.]

Expounds a universal system of classification based on the 'rhythm' of temperature and precipitation during the year, with consideration of monthly means. Particular attention is paid to conditions favourable or adverse to vegetation, i.e. warm and cold periods, dry and humid periods. Use is made of the xerothermic index [cf. *F.A.* 18 No. 14], and the ombrothermic index. The latter is obtained by plotting a graph (abscissae representing months of the year) with ordinates representing (*a*) mean monthly rainfall, *P*, in mm., and (*b*) mean monthly temperatures, *T*, in °C. on a scale double that of (*a*). When the (*a*) curve passes below the (*b*) curve, *P* is $< 2T$, and the area enclosed between the two curves indicates the duration and, in some degree, the intensity of the dry season.

1353. WÅLSTEDT, L. Bergens klimat och vegetation. **[The climate and vegetation of mountains.]** *K. Skogs- o. LantbrAkad. Tidskr., Stockh.* 97 (4), 1958 (231–70). 15 refs. [Sw.sw.e.]

Discusses in detail, for mountain conditions, radiation, wind, shelter, kinetic energy of the wind, and soil freezing. The section on shelter includes a discussion of the part played by forests in reducing wind speed and creating sheltered areas, and the need for care in felling.

1354. VINCENT, G. Výběr a přenos odrůd lesních dřevin. **[Selection and transference of varieties of forest trees.]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (5), 1958 (341–56). 33 refs. [Cz.cz.g.]

The results of provenance trials in several European countries are compared with those of Czechoslovakian trials, and show that it is essential to pay great attention to day-length, length of growing period, and the diurnal and annual rhythm of sites. Czechoslovakia is divided into 4 main regions: (*a*) mountain massifs (growing season < 100 days), (*b*) mountain massifs (100–129 days), (*c*) mountains with more moderate climate (130–165 days), (*d*) hills and lowland (> 165 days). More careful certification of seed trees and stands, and the allocation of seed to suitable sites on the basis of this geographical division, are urged. [Cf. *F.A.* 13 No. 3562.]

1355. TOMANEK, J. Badania nad przebiegiem temperatury, parowania i opadu w rębni gniazdowej. **[Investigation on the temperature, evaporation and precipitation in group-system clearings.]** *Sylwan* 102 (3), 1958 (13–31). 22 refs. [Pol.russ.e.]

Reports the results of microclimatic investigations from 5 May to 28 July, 1954, on clearings of (*a*) 20 m. diam., (*b*) 40 m. diam., (*c*) 20 × 60 m., N.–S., (*d*) 20 × 60 m., E.–W. [cf. *F.A.* 16 No. 1578]. Little variation was found in the minimum temperature, and maximum temperatures increased in the order (*d*), (*a*), (*b*), (*c*). More rain fell on the E. side of the areas than on the W., the N. and S. sides being intermediate. Variations in evaporation were small during the night, but considerable by day; evaporation increased in the order (*a*), (*b*), (*d*), (*c*). Regeneration of Pine, Oak and Fir was best on (*d*).

114. Soil. Soil Science

See also No. 1521.

1356. **Report of definitions approved by the Committee on Terminology, Soil Science Society of America.** *Repr.* from *Proc. Soil Sci. Soc. Amer.* 20 (3), 1956 (430–40).

A list of the definitions, arranged alphabetically.

114.1. Soil Physics

See also Nos. 1366, 1372, 1383, 1390, 1552, 1809, 1952, 2162–4.

1357. FERDA, J. Vliv vlhké periody 1954–1956 na změny v některých půdních vlastnostech vzhledem k různým stanovištím. **[Influence of the 1954–56 wet period on the changes in some soil properties on different sites.]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (5), 1958 (375–96). 24 refs. [Cz.cz.russ.g.]

Observations were made of the soil on 3 sites: (*a*) under a Spruce stand, (*b*) on a weedy, clear-felled area, and (*c*) on a ploughed area, all near Křivoklát. Both (*b*) and (*c*) became boggy, with a decrease in the air content and soil porosity, and leaching of minerals occurred, but the Spruce profited by the increased soil moisture. Changes in the physical properties of the soil were most marked in the top 30 cm. A number of plants that do not normally grow in Spruce stands made their appearance on (*a*), while marsh plants covered (*b*) and (*c*) to varying degrees.

1358. PELÍŠEK, J. Klasifikace a charakteristika dynamiky půdní vlhkosti v lesních oblastech ČSR. **[Classification and characterization of soil moisture dynamics in the forest areas of the Czechoslovak Republic.]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (8), 1958 (689–712). [Cz.russ.g.]

Defines six types of forest soil from 'dry' to 'boggy', indicating which genetic soil types are found in them, and traces the moisture distribution and movement in them for the different seasons and horizons.

1359. COUTTS, J. R. H. **Moisture and temperature conditions in afforested areas in Aberdeenshire.** *Forestry* 31 (2), 1958 (167–76). 6 refs.

Extends results already published [cf. *F.A.* 16 No. 3728] on soil temperature profiles and the efficiency of daily maxima and minima of temperature in the estimation of mean weekly temperatures. Results are given for the interception of rain by vegetative covers of various types and for the differences in moisture status that occur between soils in an open ride and under the forest canopy. The amplitudes of diurnal temperature fluctuations in the ride and under the forest canopy have been compared. Over a period of 2½ years, the latter average ca. 60% of the former. The mean temperatures in the ride are higher than those under the canopy between April and September and lower between September and March; the greatest differences, which are of the order of 1° C., occur in the later part of spring and the earlier part of winter. *From author's summary.*]

1360. BAY, R. R. **Occurrence and depth of frozen soil.** *J. Soil Wat. Conserv.* 13 (5), 1958 (232–3). 1 ref.

Presents preliminary results of concrete-frost measurements under different forest types and in a forest clearing in Feb.–April 1957. Concrete frost occurred most frequently and was deepest (averaging ⩾ 8 in.) under the open area. It was found least often under a White Pine/hardwood stand, where it was also shallowest (1·9 in.); average depth increased to 3·5 in. under Aspen and to 5·9 in. under Balsam Fir stands.

114.2. Soil Chemistry

See also Nos. 1366–70, 1372, 1377–8, 1381–3, 1407, 1552, 1801–3, 1950.

1361. TILLER, K. G. **The geochemistry of basaltic materials and associated soils of south-eastern Australia.** *J. Soil Sci.* 9 (2), 1958 (225–41). 14 refs.

The distribution of 18 elements in (*a*) parent materials, (*b*) profiles, and (*c*) clay fractions separated from selected horizons, was studied in 4 soils: 2 podzols (one with ground-water) on aeolian sands over buried basaltic tuff soils, carrying 40- to 50-year *Pinus radiata* (some very poor); a basaltic tuff soil (previously cultivated) containing a buried profile formed on an earlier ash shower; and an olivine basalt soil (quarry face). The main factors influencing the distribution of the elements are translocation by plants, their mobility on weathering, association with clay fractions, and restricted drainage. For both sands and volcanic soils, the order in which the elements are concentrated in (*a*), in the surface of hard-pan horizons of (*b*), and in (*c*), and the order in which they tend to be lost from the weathering zones of the basaltic soils etc., are discussed. Part of the interest lies in the influence of the buried volcanic soils on the nutrition of Pines.

1362. IKE, A. F., JR., and STONE, E. L. **Soil nitrogen accumulation under Black Locust.** *Proc. Soil Sci. Soc. Amer.* 22 (4), 1958 (346–9). 24 refs. O.R.E.

Soil N accumulation was studied beneath 4 stands of *Robinia pseudoacacia* in New York State. As opposed to adjacent control sites, significant increases in N were noted under three 16- to 20-year plantations, but not under one of 5–10 years. These changes extended below the 0–7 in. layer, with total N increases of ca. 600 lb./acre in the 0–20 in. layer. The total annual return of N to the soil surface from the foliage probably exceeds 50 lb./acre.

1363. KAURIČEV, I. S., and NOZDRUNOVA, E. M. Harakteristika okislitel'no-vosstanovitel'nyh uslovij v počvah pod različnymi tipami nasaždenij. [**Oxidation-reduction conditions in soils under different types of stands.**] *Izv. Timirjazev. sel'.-hoz. Akad., Moskva* No. 5, 1958 (161–76). 19 refs. [Russ.e.] O.R.E.

The investigations were made on (1) strongly podzolic soils under 80- to 90-year Spruce; (2) gley-type podzols under 50- to 60-year Spruce with a Birch and Aspen understorey; (3) sod-medium-podzolic soils under 55-year Pine with a second storey of Maple, Oak, Birch and Spruce, and an underwood of shrubs: (1) and (2) were heavy clay-loams, and (3) a light sandy loam. The monthly changes in soil moisture, soil temperature, redox potential, FeO content, water-soluble humus, pH, exchangeable (1 *N* KNO_3 extract) and mobile (0·1 *N* H_2SO_4 extract) Al, and P_2O_5 content are tabulated, as the means of 3-year measurements, and discussed.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 1357, 1361, 1377, 1383–4, 1615–6, 2494.

1364. PROUDFOOT, V. B. **Problems of soil history. Podzol development at Goodland and Torr townlands, Co. Antrim, Northern Ireland.** *J. Soil Sci.* 9 (2), 1958 (186–98). 34 refs.

From archaeological evidence, C^{14} dating, and a study of the podzolization of a sub-peat (water-sealed) soil on boulder clay over chalk, regarded as fossil and having two superimposed podzols, and of a well-marked podzol pan developed in the past 100 years, evidence is adduced for a chronology covering the development of the soil from boulder clay (7000–3000/2500 B.C.), through the Neolithic forest clearance (3000–2500), blanket bog initiation (2200), and later land use (with further podzolization) up to the present day.

1365. PELÍŠEK, J. Genetická klasifikace a charakteristika půdotvorných procesů v lesních oblastech ČSR. I. Půdotvorné procesy kyselé (acidní). [**Genetical classification and characterization of soil-forming processes in the forest regions of Czechoslovakia. I. Acid soil-forming processes.**] *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (9), 1958 (801–22). [Cz.cz.russ.g.]

Divides acid processes into three groups: (1) for podzols; (2) for brown earths; (3) for grey earths, and divides each group into several types.

1366. MAŘAN, B. Studie lesních půd na říčanské žule. [**A study of forest soils on Říčany granite [near Prague].**] *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (8), 1958 (639–58). 17 refs. [Cz.russ.g.]

A detailed chemical and physical analysis of the soil profiles (mainly podzols) under pure Scots Pine, Pine with a lower storey of Oak, Beech, Hazel etc., and pure Spruce, with particular reference to soil degradation and species effects.

1367. PEŘINA, V., and VINTROVÁ, E. Vliv opadu na humusové poměry borových porostů na pleistocenních píscích. [**The influence of litter on the humus in Pine forests on Pleistocene sands.**] *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (8), 1958 (673–88). 21 refs. [Cz.russ.e.]

Litter fall as measured in a 94-year pure Pine stand was 3614 kg./ha./year, made up of 60·4% needles, 14·4 dead bark, 11·1 cones, 7·2 branches < 0·5 cm. diam., 5·2 branches > 0·5 cm. diam., 0·3 buds, 0·26 flowers, and 0·14 insects. Comparisons with three neighbouring stands of different ages showed that the amount of litter fall increases with the age of the stand. The layer of raw humus had an unfavourable influence on the water balance in the upper horizons, and on the bacterial population. Results of chemical and biological analysis of the humus are tabulated.

1368. RÜHL, A. Eine Auswertung von Streuanalysen aus norddeutschen Mittelgebirgen. [**An evaluation of litter analyses from mountain areas in N. Germany.**] *Forstwiss. Cbl.* 76 (11/12), 1957 (364–76). 20 refs. [G.g.]

The CaO contents of 94 samples of fresh Beech litter from several N. German sites varied between 0·74 and 4·02%. Ratios between the CaO content of fresh litter and the available CaO in the main rooting zone were determined for 4 different types of soil, and it was also found that the fluctuations in CaO content of the litter between the individual years of the study were clearly connected with the precipitation, CaO contents being higher in dry years. Similar work was done on the K, N, and Mg contents of the litter, and the Beech litter analyses were compared with those of some other broad-leaved species. After one year on the forest floor, Beech litter contains significantly more N and only slightly less CaO than fresh litter, while with still older litter, the CaO content decreases significantly and the N content increases only slightly.

1369. GRADUSOV, B. P. Vlijanie lesnyh podstilok na himičeskie svojstva počv v podzone južnoj tajgi. [**The influence of forest humus layers on chemical soil properties in the southern taiga zone.**] *Počvoved.* 1958 (8), (111–6). 15 refs. [Russ.russ.e.] A.P.B.

Data are tabulated on the mineral and organic composition of the humus layers and upper soil horizons of podzolic soils at Zvenigorod, Moscow province, under (*a*) 83-year Spruce with *Pleurozium schreberi* and *Hylocomium proliferum* in the moss layer, and (*b*) 67-year Birch with a sparse ground layer of *Calamagrostis epigeios*, *Pteridium aquilinum*, *Poa nemoralis* and other herbs. The chief features of the soil under (*a*), as compared with (*b*), were: higher contents of bituminous and water-soluble organic substances throughout A_0 and A_1; lower contents of cellulose and hemicelluloses in the upper A_0 horizons; lower humic-acid and higher fulvic-acid contents in the lower A_0 and the A_1 horizons; a lower humus % in A_1; greater acidity in the upper horizons; and less accumulation of Ca, Mg, K, S, P and N in A_1, where the degree of base saturation was 41% as compared with 64% for (*b*).

1370. BIRJUKOVA, A. P. Rolj lesonasaždenij v rassolenii počvy pri orošenii. [**The influence of forest plantations in the desalinization of irrigated soils.**] *Počvoved.* 1958 (8), (29–33). 10 refs. [Russ.russ.e.] A.P.B.

Compares the physical properties of heavy clay-loam solonetz and light-chestnut solonetz-type soils under (*a*) 50-year-old plantations composed chiefly of *Ulmus campestris* s.l., *Acer tataricum* and *Caragana arborescens*, irrigated twice yearly for the first 30 years, and (*b*) fallow steppe near by, at Valui, Stalingrad province. Under (*a*) the depth of the A horizon increased from 14 to 20–23 cm., porosity and permeability increased in the A and B_1 horizons, and marked leaching occurred of both easily soluble salts and carbonates and sulphates, especially $CaSO_4$. The salts were leached into the ground-water, which rose under (*a*) by 40–70 cm. The salt content of the soils differed under the 3 species even over short distances (50–100 cm.); owing to its high Cl content (reaching the toxic content of 0·21% at 60 cm.), the soil under *C. arborescens* was much less favourable to tree growth than that under Elm and Maple, where leaching was more pronounced. These differences are attributed to differences in the structure of the root system and the physiology of nutrient uptake.

1371. AVERY, B. W. **A sequence of Beechwood soils on the Chiltern Hills, England.** *J. Soil Sci.* 9 (2), 1958 (210–24). 25 refs.

Discusses, with generalized profile descriptions and tabulated data, and in relation to the soil-forming factors (climate and vegetation), the salient features and evolution of the genetic soil types forming the sequence, ranging from rendzina through brown earth (*sol lessivé*), to podzol (with the transitional soils, brown calcimorphic [rendziniform], and podzolic). This sequence, based on chalk and associated superficial deposits, is closely paralleled by developmental sequences established elsewhere on uniform calcareous materials. On base-deficient soils, mor formation under Beech is conditioned by local climate and management as well as by inherent fertility variation, and is only associated with advanced podzolization on appreciably sandy materials. 'Micro-podzols' (possibly transitory) are formed on silty plateau soils with imperfect drainage.

114.4. Soil Classification. Soil Types

See also Nos. 1361, 1363–5, 1369–71, 1615.

1372. MÜLLER, M. Auewaldböden des schweizerischen Mittellandes. [**River flood-plain soils of the Swiss Plateau.**] *Mitt. schweiz. Anst. forstl. Versuchsw.* 34 (2), 1958 (37–86 + 4 plates, 4 tbls.). 87 refs. [G.g.f.it.e.]

Four soil profiles, from (*a*) *Salicetum albo-fragilis*, (*b*) an *Equisetum-Alnetum* and (*c*) two *Fraxino-Ulmetum* sites, all from the middle courses of rivers, were analysed for structure, chemical composition, organic-matter content, pH, etc. The clay fraction was analysed by X-ray and differential thermal analysis. The (*a*) soils are situated very little above river level and are often flooded, the A horizon is undeveloped and crumb structure

rudimentary. The (*b*) soils are slightly more elevated, the A horizon is rather more, and the crumb structure moderately, developed. The (*c*) soils are the most elevated, with a well developed A horizon and crumb structure. The C/N ratio in the upper horizons of (*c*) often approaches 14; in (*a*) and (*b*) it varies irregularly from one horizon to another. The soils, all of which are zonal, resemble Kubiena's Rambla, Borowina and Braune Vega types respectively.

1373. MATJUK, I. S. O nekotoryh tipah Pridonskih bugristyh peskov. [**Some dune-sand types in the Don valley.**] *Počvoved.* 1958 (8), (127–33). 7 refs. [Russ.russ.e.] A.P.B.

The soils are classified into three types: (1) aeolian sands covering buried soils; (2) aeolian sands covering undisturbed, buried sands; and (3) sands of undisturbed structure. Notes are added on the suitability of each for afforestation with *Pinus sylvestris*.

1374. SIMONNEAU, P. Observations sur le Salant dans l'Ouest algérien. [**The saline soils in western Algeria.**] *Travaux des Sections Pédologie et Agrologie, Service des Études Scientifiques, Alger, Agrologie* No. 11, 1957. pp. 36 + 17 photos. 16 refs. [F.]

An account of the saline soils, their vegetation (including *Tamarix africana* stands) and some attempts at planting with *Eucalyptus occidentalis*.

1375. PANTON, W. P., and JIN, A. T. **Soil survey report. No. 7, The Bukit Goh Forest Reserve, near Kuantan, Pahang.** *Malay. agric. J.* 41 (1), 1958 (3–9 + 1 photo, 1 map). 4 refs. O.R.E.

Describes the forest vegetation (including *Shorea* spp.) briefly, and the soils, mainly fertile Kuantan clay, in more detail. [Cf. *F.A.* 19 No. 3774.]

1376. ISBELL, R. F. **The soils of the Inglewood—Talwood—Tara—Glenmorgan region, Queensland.** *Technical Bulletin, Queensland Bureau of Investigation, Brisbane* No. 5, 1957. pp. 116 + 3 maps. 39 refs.

Much of the region posseses a dense timber cover, *Acacia harpophylla* and *Casuarina lepidophloia* forests being particularly widespread. In general, a fairly close relationship exists between the nature of the soils and the plant communities.

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 1553, 2162–4, 2186.

1377. GAGNON, D., LAFOND, A., and AMIOT, L. P. **Mineral nutrient content of some forest plant leaves and of the humus layer as related to site quality.** *Canad. J. Bot.* 36 (2), 1958 (209–20). 33 refs. O.R.S.

Nutrient content of the humus and foliage of the lesser vegetation of forest sites (herbs, dwarf shrubs and mosses) was investigated on 11 site types and 4 site classes in the N.E. coniferous region of Canada. Nutrient content of the leaf material showed no differences within a given species that could be related to site class, whereas that of the A horizon was closely related to site productivity, indicating that the differential accumulation of nutrients in the cells of these plants depends on the inherent properties of the species rather than on the amount of available nutrients in the humus on which they grow.

1378. Techniques de prélèvements en vue du diagnostic chimique du besoin en engrais. [**Methods of sampling for foliar analysis in connexion with fertilizer requirements.**] *Bull. Inform. Inst. nat. Étude agron. Congo belge* 7 (5), 1958 (273–302). [F.]

Covers types of problem, principles, general advice on sampling, choice of site, foliar sampling of Coffee, Oil Palm, Cacao, *Citrus* spp., Tea, *Hevea* and annuals, soil sampling, the interpretation of two cases from the foliar and soil data presented, standard forms for requesting information and the labelling of samples.

1379. MITSCHERLICH, G. Bodenverschlechterung und Düngung in ertragskundlicher Sicht. [**Soil degradation and fertilizing from the point of view of yield.**] *Forst- u. Holzw.* 13 (21), 1958 (415–21). 19 refs. [G.]

Reviews recent German work on the harmful effects of litter removal and pure conifer plantations (especially pure Spruce) on the forest soil and hence on the forest itself, and also work on forest fertilizing and site amelioration.

114.6. Soil Biology

See also Nos. 1556, 1591, 1616, 2057–8, 2494.

1380. SHIPMAN, R. D. **Microbial population in the rhizosphere of Yellow Poplar seedlings.** *Amer. Midl. Nat.* 58 (2), 1957 (413–21). 13 refs. B.A.P.

The study was made to investigate the quantitative distribution of certain classes of soil organism present in the root system of Yellow Poplar seedlings. Counts were made from the rhizosphere and comparative estimates were also made at some distance from the roots. The bacteria and actinomycete populations were far higher in the rhizosphere than outside it. This was most marked when buds were breaking. In general, an increase in the number of bacteria, actinomycetes and fungi occurred with advancing stages of vegetative development of the seedlings.

1381. WHEELER, B. E. J., and YEMM, E. W. **The conversion of amino acids in soils. I. Amino-acid breakdown and nitrification in cultivated and natural soils.** *Plant & Soil* 10 (1), 1958 (49–77). 16 refs.

Discusses, with 15 graphs and 6 tables, the ammonification and nitrification in fresh undried soils (including, in part, soils from Beech, Oak and Birch, and mixed deciduous forests), percolated with amino-acids, $(NH_4)_2SO_4$, etc., giving data on the content of N forms in the percolate, CO_2 output and O uptake of the soil, pH, and bacterial populations.

1382. BIRCH, H. F. **Further aspects of humus decomposition.** *Nature, Lond.* 182 (4643), 1958 (1172). 4 refs.

Recent experiments have shown that the characteristic flush of decomposition that follows the wetting of a dry soil [cf. *F.A.* 18 No. 34] can be partly prevented by the addition of 0·5 g. of activated

charcoal per 30 g. soil, and almost completely prevented by ⩾ 1·5 g. When the soils were then oven-dried and re-wetted without further treatment, decomposition was still arrested. When a slowly decomposing moist soil was treated with ether vapour under vacuum and the excess vapour then removed, a similar flush of decomposition resulted, which was also repeated with successive treatments. Here, however, the flush of decomposition was not inhibited by charcoal.

1383. Omzetting van organisch materiaal in de grond. [**Breakdown of organic material in the soil.**] *Meded. Inst. toegep. biol. Onderz. Nat.* No. 38, 1958 (11–8, 31). [Du.e.]

[Cf. *F.A.* 19 No. 1312.] Studies were made in an Oak wood, covering 1·2 ha., with the 3 types: (1) calcareous mull, carrying Oak, Birch, Poplar and Alder; (2) acid mull, carrying Oak and Birch; and (3) mor, carrying practically pure Oak. Litter analyses during autumn showed 100% Oak on (3), 75% Oak and 25% Birch on (2), and 35% Oak, 30% Birch, 20% Poplar and 15% Alder on (1). Total litter production in (1), (2) and (3) was 350, 380 and 330 g./sq. m. respectively. Differences in floor level were slight (60 cm.), but (3) was found on the highest and (1) on the lowest parts of the area. Moisture measurements in the upper litter layer gave values twice as high on (1) and (2) as on (3). The pH value for the site was ca. 3·4, except on (1) which had a pH of ca. 7, and a transitional zone with a pH of ca. 5. In all, 80 species of higher plants were found on the area; 25 occurred only on (1), 19 were typical for mull (1 and 2), and only 3 were found exclusively on (3). In the top 5 cm. of the mineral soil of (3), mycelia were 5 times as plentiful as in the corresponding layer of (1) and (2). Cellulose-attacking fungi were slightly less frequent in (3) than in (1) and (2). Cellulose-attacking bacteria were isolated from both soil and litter in (1) and (2), and only from soil in (3). Of the macrofauna, saprophagous forms were considerably more frequent in (1) and (2); predatory forms were fairly evenly distributed, except for the Geophilidae, which were most frequent in (3). Litter breakdown by the soil fauna occurred only in moist places, most rapidly in Alder, then in Poplar, Birch and Oak in descending order, and laboratory tests with snails, millipedes and larvae of 3 insect species showed that Alder was preferred. *Lumbricus rubellus* grew more rapidly when fed on Alder than on the other types of litter. *Enoicyla pusilla* (present in (1) at the rate of 1000/sq. m. and in part of (2) at 250/sq. m.) was consuming in April 0·6 mg. per individual per day, and during the period of greatest activity (March–May) consumed 60% and 5% respectively of the total Oak litter in each plot. Its total population of 3,000,000 individuals consumed 192 kg. of Oak litter, 93% of which was again excreted; a higher pH and the mechanical breakdown into smaller particles appeared to stimulate the microfauna, especially bacteria, and for the first 3 weeks after excretion the CO_2 production was 13 times that of the original material.

Amounts of litter in the 3 profile types were calculated from samples at intervals throughout the year. Alder, occurring only in (1), had disappeared by April; Poplar on (1) and (2) was reduced to 30% by April, but further breakdown was slow and not complete until October; Birch decomposed rapidly especially in (2); Oak varied with the site type, 70%, 60% and 30% being decomposed by April, and 100%, 95% and 85% by October, on (1), (2) and (3) respectively.

1384. Schremmer, F. Bibiolarven als Verarbeiter von Nadelstreu. (Ein Beitrag zur Ökologie der Bibioniden (Dipt.).) [**Larvae of *Bibio* spp. as decomposers of conifer needle litter. (A contribution to the ecology of the Bibionidae).**] *Anz. Schädlingsk.* 31 (10), 1958 (151–3). 9 refs. [G.]

Observations on the habits and biology of *Bibio* spp., with particular reference to the feeding habits of the larvae and their rôle in the decomposition of conifer litter.

1385. Karppinen, E. Die Oribatiden-Fauna einiger Schlag- und Brandflächen. [**The oribatid fauna of some clear-felled and burnt areas.**] *Annales Entomologici Fennici, Helsinki* 23 (4), 1957 (1958), (181–203). 13 refs. [G.] (Also a short version in *Metsät. Aikak.* 1958 (8/9), (271–4). 6 refs. [Fi.e.].) I.I.E.

Sample plots were studied in 1954–55 in areas on OMT sites, clear-felled some 10 years earlier in Tuusula parish and in 1955–56 in burnt-over areas on MT sites in Ruovesi and Juupajoki parishes; data were also available from areas burnt in 1928, 1951 and 1953–1956. Tables and graphs are given showing variations in pH, plant cover and soil fauna (quantities and species) after treatment. During 1–5 years after clear felling (i.e. the normal period elapsing between felling and burning), the number of mites increased rapidly, but over a period of 10 years after felling, it decreased to about ½; the variety of species had increased but numbers within species were small. Immediately after burning, numbers dropped very sharply to an extremely low level in all layers, increasing again after 4 years; in the surface layer (0–1 cm.) this increase was sharp, passing the original figure in something over 5 years, but in the deeper layers (1–3, and 3–5 cm.) figures were still below the original after 27 years.

1386. Ronde, G. Studien zur Waldbodenkleinfauna. [**Studies on the microfauna of forest soil.**] *Forstwiss. Cbl.* 76 (3/4), 1957 (95–126). 45 refs. [G.g.]

Investigations of the soil microfauna of some of the coniferous and broadleaved forests in S. Germany traditionally prone to insect damage showed that (*a*) a few species preponderated in the total population, and the total number of species was small; and (*b*) Collembola were abundant, and nematodes, Lumbricidae and isopods few. Investigations to discover whether the soil microfauna could be enriched and increased by liming and N fertilizing showed that: (1) liming, and planting lupins and Red Oak took a long time to become effective under Pine; (2) *Bupalus piniarius* attack was less on limed stands than on unlimed; (3) N fertilizing usually produced results faster than liming. Findings so far indicate that lime, hyperphosphate

and gaseous NH_3 fertilizing form the best combination for creating optimum conditions for soil microfauna on the sites in question. Work continues.

1387. Gavrilov, K. A., and Perel', T. S. Doždevye červi i drugie bespozvonočnye v počvah lesov Vologodskoj oblasti. **[Earthworms and other invertebrates in forest soils of Vologda province.]** *Počvoved.* 1958 (8), (133–40). 13 refs. [Russ.russ.e.] A.P.B.

In the Spruce and Birch forests of the region, which are subject to periodic waterlogging, earthworms average < 10/sq. m. The commonest species, *Octolasium lacteum* and *Dendrobaena octaedra*, are able to survive waterlogging. Data on the distribution and population density of these and other species are given and discussed. Larvae of Elateridae and Diptera predominate among the other invertebrates.

116. Hydrology. Water Conservation, Soil Conservation and Erosion

See also Nos. 1349–51, 1359–60, 1521, 1548, 1619, 1783–90, 1809, 1828–31, 2656.

1388. Tomanek, J. Badania pluwiometryczne w borze iglastym Białowieskiego Parku Narodowego. **[Investigations with rain gauges in the *Piceeto-Pinetum* of the Białowieża National Park.]** *Roczn. Nauk leśn.* 21, 1958 (61–94). 37 refs. [Pol.russ.e.]

Rain gauges were set up in a cruciform pattern under the canopy of an old, multi-storeyed Pine/Spruce stand, and in a clear area near by, and measurements made of precipitation during 1951–53. Detailed results are tabulated. It was found that the amount of precipitation penetrating the canopy increased with, but was not exclusively dependent on, the total amount of precipitation, factors such as intensity and duration of precipitation, and wind velocity also exerting an influence. The average precipitation penetrating the canopy was 66% of the total as measured outside the forest.

1389. Rutkovskij, V. I. Vlijanie lesov na nakoplenie i tajanie snega. **[The influence of forests on the accumulation and melting of snow.]** In *Sbornik: Sneg i talye vody. Ih izučenie i ispol'zovanie.* Akademija Nauk SSSR, Moscow. 1956. pp. 184–205. [Russ.] From *abstr.* in *Referat. Ž. (Biol.)* 1958 (4), (No. 15338). H.S.B.

The relationship between forest and snow cover was studied at points between Minsk and Ufa latitudinally, and Leningrad and Sumy province (Ukraine) longitudinally, for 3 winters. Spruce forests had the greatest effect: snow cover under Spruce canopy was always less than on clearings near by, though the influence varied with the amount of snowfall. The rate of snow-melt was considerably slower and less dependent on the spring weather under Spruce than under Pine or hardwoods. Hardwood stands influenced snow accumulation and rate of snow-melt least, while Pine stands were intermediate.

1390. Pierce, R. S., Lull, H. W., and Storey, H. C. **Influence of land use and forest condition on soil freezing and snow depth.** *For. Sci.* 4 (3), 1958 (246–63). 19 refs.

Reports on a 2-year study, carried out in 18 land-use conditions from bare fields to forest stands, at 6 localities in 5 states from Maine to Pennsylvania. Data include (*a*) average concrete-frost depths, (*b*) concrete-frost frequency, (*c*) accumulated frost depths, and (*d*) snow depth. Values for (*a*) in inches were open land 3–7, coniferous stands 3, hardwood stands 1·5. There are indications that (*a*) is greater in hardwood reproduction than in poles and sawtimber, and that grazing, but not light logging, significantly increases (*a*) in hardwood stands. There was a highly significant correlation (0·876) of (*a*) and (*b*). For each inch increase in (*a*) there was a 13% increase in (*b*). For (*c*) measured in inch-days, mean values in the forest were 74 and in the open 412. Values under conifers were ca. 8 times those in hardwood stands. For (*d*), depths averaged 8 and 4·1 in. respectively for forest and open lands, the ratio in hardwoods/conifers/open land being 1·75/1·5/1.

1391. Szymański, J. Kształtowanie bilansu wodnego w dorzeczach mniej i więcej zalesionych na terenach niskich. **[The water balance in low-lying river basins having various degrees of forest cover.]** *Zeszyty Naukowe Wyższej Szkoły Rolniczej (Melioracja III), Wrocław* No. 13, 1958 (105–41 + 2 maps). 17 refs. [Pol.e.]

Compares the precipitation from 1948 to 1954 in two neighbouring river basins: (*a*) the Upper Barycz basin (ca. 26% forest cover), and (*b*) the Orla basin (ca. 16%). While there was no difference in the mean annual precipitation, (*a*) had more days with precipitation, and (*b*) a higher mean precipitation on days when precipitation did occur. The greater run-off from (*a*) is ascribed to the steeper slopes, the soil type, vegetation and land use, etc.

1392. Delfs, J., *et al.* Der Einfluss des Waldes und des Kahlschlages auf den Abflussvorgang, den Wasserhaushalt und den Bodenabtrag. **[The influence of forests and clear fellings on run-off, the water economy and soil erosion.]** *Aus dem Walde, Hannover* No. 3, 1958. pp. 223 + 32 photos, 21 sets of gphs., + pp. 105 in a separate supplement of tables. 36 refs. [G.g.e.]

Reports on the first 5 years' (1949–53) results of investigations in the Upper Harz mountains (at ca. 500–760 m.) S. of Goslar, comparing (1) the clear-felled catchment of the Lange Bramke, ca. 75 ha., and (2) the forested Wintertal valley, ca. 87 ha., together with supplementary data from investigations on two smaller valleys and two springs, begun in 1950 and 1951, and some subsequent results. The forest is pure Spruce, mainly of sawtimber size, except in one valley where the pole stage is commonest. Climatic, geographical, and topographical data etc. and experimental methods are described and day-to-day measurements of temperature, humidity, precipitation and stream flow are presented in the tabular supplement. Mean annual interception increased with age; it was higher in summer than in winter [cf. *F.A.* 19 No. 2660]. Water yield per annum and sq. km. was higher in (1) than in (2), but winter yield was slightly higher in (2). No clear relations regarding

flood peaks emerged. These were frequently higher in (2) when rain followed a thaw, but generally higher in (1) during summer. From January to May, stream flow during periods of low water was higher in (1), but from about August onwards, the position was reversed. Computations of water balance arrive at a mean annual evapo-transpiration of 521 mm. for (1) and 579 mm. for (2). Winter storage is estimated at 169 mm. for (1), and 222 mm. for (2). Suspended loads of eroded materials were 56 tons/sq. km. for (1) against 18·6 for (2), and bed loads 2 and 0·05 cu.m. respectively. In experiments on small plots in 1950, run-off amounted to 17% on bare soil, 4% on humus, 1% on needle litter, and 0·2% on *Aira-Vaccinium* cover. Corresponding erosion figures were ca. 1500 g., 50g., 4 and 0g. per sq. m. *From authors' summary.*

1393. ČERKAŠIN, A. Vliv lesa na hydrologický režim našich toků. **[The influence of forests on the water regime of rivers in Czechoslovakia.]** *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (8), 1958 (729–36 + 1 map). 14 refs. [Cz.]

1394. BUDYKA, S. H. O vlijanii lesa na vodnyj režim rek. **[The influence of forest on stream flow.]** *Sbornik Naučnyh Rabot po Lesnomu Hozjajstvu, Institut Lesa BSSR* No. 7, 1956 (80–95). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (4), (No. 15339). [Russ.] H.S.B.

The water balance of forest and fields is reviewed in detail on the basis of data collected by various authors. The optimum forest area % in the European part of the U.S.S.R., as regards mean annual stream flow, is thought to lie between 20 and 30. In some latitudes, for every 5% increase of forest cover the mean annual stream flow is said to increase by 0·24 litre/sec. per 1 sq. km. of catchment.

1395. BISWELL, H. H., and SCHULTZ, A. M. **Effects of vegetation removal on spring flow.** *Repr.* from *California Fish and Game* [*San Francisco*] 44 (3), 1958 (211–30). 18 refs.

Quantitative measurements were made of the effects of brush removal and manipulation on the flow of springs and streams. Burning or cutting of trees and shrubs both increased flow, usually almost immediately, the increase varying with different factors, e.g. site of watershed, density and kind of plants, type and depth of soil. Three principles govern the changes: (1) conversion from deep-rooted to shallow-rooted species (grass and annuals) makes water in the deeper zones available for spring flow; (2) removal of the transpiring surface of plants whose roots are in free water results in immediate increases in flow; (3) practices that decrease the infiltration capacity of the soil and result in high surface run-off may retard spring flow or stop it altogether. *From authors' summary.*

1396. MARSTON, R. B. **Parrish Canyon, Utah: a lesson in flood sources.** *J. Soil Wat. Conserv.* 13 (4), 1958 (165–7). 4 refs.

Following serious floods in 1930, summer precipitation and run-off were measured for 11 years (1936–46) on plots with a stunted *Populus tremuloides* cover. Summer precipitation totalled 34·08 in. for this period, and of this total only 0·07 in. was measured as surface run-off, and no sediment was eroded. In 1947 the trees were felled to ground level, the litter was removed and the herbaceous cover burnt. For the 11 years 1947–1957 summer rainfall totalled 42·23 in., and surface run-off was 4·56 in., causing a soil loss of 0·67 area inch, which equals 3·24 acre-ft. of sediment per sq. mile annually. The run-off and erosion occurring on denuded plots and plots with vegetation cover during a large storm in each period were compared. It is concluded that the high erosion rate on the catchment slopes in the area has been aggravated by heavy grazing and burning. [Cf. *F.A.* 13 No. 3579.]

1397. **Emergency vegetation of burned watersheds: annual report 1957.** California Division of Forestry, Department of Natural Resources. 1958. pp. 10.

The California Division of Forestry, acting under legislative authority, has recently engaged in a programme of emergency revegetation of catchment areas burnt during wildfires, where there is a serious danger of erosion, silting etc. The area involved during 1957 was 25,600 acres, and > 154,000 lb. of grass seed was used. Native herbs, shrubs etc. will come in later and replace the grass.

1398. WEBB, L. J. **Catchment deterioration—a combined agricultural and forestry problem.** *Journal of the Australian Institute of Agricultural Science, Melbourne* 23 (3), 1957 (251–2). 5 refs. C.G.B.

A note emphasizing the importance of forests on catchment areas, with particular reference to conditions in New South Wales, and including data on infiltration rates for different forest-cover and soil types and on weight and chemical composition of leaf litter from the Whian-Whian State Forest.

1399. **Water from the mountains.** *Rural Research in C.S.I.R.O., Melbourne* No. 24, 1958 (8–12 + 1 map, 1 dgm.). 3 refs. I.M.I.

Discusses the effect of vegetation on run-off and erosion, and of grazing, burning etc. on vegetation, based on research in the Kosciusko State Park in the Australian Alps [N.S.W.], indicating that the natural vegetation, which from 4500 to 6500 ft. is a subalpine woodland dominated by *Eucalyptus niphophila*, with a dense sward of *Poa caespitosa*, is the best. [Cf. *F.A.* 19 No. 1328.]

1400. KIRWALD, E. Heilung von Bodenwunden- **[Healing soil wounds.]** *Schriftenreihe der Landes, forstverwaltung Baden-Württemberg, Stuttgart* No. 3. 1958. pp. 63. 14 refs. [G.g.]

An illustrated guide describing simple techniques of proven value for the stabilization and revegetation of eroded land, gullies, landslides, road cuttings, stream banks, gravel pits etc., dealing chiefly with drainage and with various methods of using brushwood—as a mulch, as a partly or wholly buried reinforcement etc., and also as live fencing.

1401. GENDEL'MAN, A. M. Razvitie processov êrozii i bor'ba s nimi v uslovijah južnoj stepi USSR. **[The development of erosion processes and their**

control in the southern steppes of the Ukraine.] *Počvoved.* 1958 (8), (69–77 + 2 maps). 11 refs. [Russ.russ.e.] A.P.B.

Draws attention to serious erosion occurring over an area of 9000 ha., and considers methods of control, including shelterbelt planting. As an example, both actual and proposed measures on a collective farm in the area are described.

1402. JANKOVIĆ, Č. Integralne melioracije planinskih i pretplaninskih slivova. (Pojam princip i procedura.) [**An integrated system of improving catchment areas in mountains and foothills. Concepts, principles and procedure.**] *Šumarstvo* 11 (5/6), 1958 (295–304). 12 refs. [Serb.f.*f*.e.]

Stresses the need for integrated planning in mountainous and hilly catchment areas in Jugoslavia, including, in addition to the drainage of waterlogged valley bottoms, conservation measures higher up the slopes e.g. the re-establishment of grass or tree vegetation, torrent training and stabilizing loose surfaces, and, on gentler slopes, terracing, contour ploughing etc.

1403. MESSINES, J. **Forest rehabilitation and soil conservation in China.** *Unasylva* 12 (3), 1958 (102–20). 1 ref.

Outlines the forest types of China, the extent, causes and multiple effects of erosion, and the rehabilitation works, begun in 1949 and continuing under successive Five-year Plans. The growing timber requirement and the need to restrain land degradation are being met by (1) clear felling and planting, (2) protection and improvement of natural forest. A general account is given of both these measures, and particularly of afforestation organization, shelterbelt planting, planting techniques and species, and of training and research.

1404. **[Bibliography [on torrent control] 1955–56.**] [*Docum.*] *4th Sess. FAO European For. Comm. Wkg. Party on Torrent Control, Austria 1958* No. *FAO/EFC/TORR.* 13, 1958. pp. 29. 212 refs. [F.]

Covers literature published in Austria, France, and Switzerland.

1405. DAS, E. S. **Problem of wind erosion in the Punjab and experience gained so far to meet it.** *Indian For.* 84 (9), 1958 (566–7).

Reports on the success or otherwise of herbaceous species, shrubs, and small trees, that have been used in trials to combat wind erosion.

1406. SATYANARAYAN, Y. **Treelands or grasslands in the Rajputana [Rajasthan] desert? A plea for grasslands.** *Indian For.* 84 (9), 1958 (549–53). 14 refs.

The advantages of establishing grasses are discussed and suitable species mentioned, while the cost and difficulty of establishing trees in the desert are pointed out. It is thought that hardy, drought-resistant trees should be planted either simultaneously with the sowing of grass, or after the stabilization of the dunes by grass.

13. General Zoology

1407. GRIMSHAW, H. M., *et al.* **The mineral content of birds and insects in plantations of *Pinus sylvestris* L.** *Oikos* 9 (1), 1958 (26–34). 3 refs.

Presents the results of analyses of *Parus caeruleus*, *P. ater*, *Regulus regulus* and the invertebrate canopy fauna in a Scots Pine plantation, for fresh and dry weight, total ash and Na, K, Ca, Mg and P content. The relative importance of the trees and the vertebrate and invertebrate populations in the movement of minerals through woodland ecosystems should be studied more fully.

1408. ATKINS, M. D., and FARRIS, S. H. **A technique for measuring flight muscle changes in the Douglas-Fir beetle, *Dendroctonus pseudotsugae*.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (4), 1958 (3–4). [Cf. *F.A.* 18 No. 3682.]

14. Systematic Zoology

1409. KARPIŃSKI, J. J. Materiały do poznania pluskwiaków równoskrzydłych podrzędu Homoptera Cicadina biocenozy lasu Białowieskiego Parku Narodowego. [**Material for identification of Homoptera of the sub-order Cicadina in the biocoenosis of the Białowieża National Park.**] *Roczn. Nauk leśn.* 21, 1958 (49–60). 4 refs. [Pol.russ.e.]

A preliminary report, tabulating by biotopes and month of capture the 72 species of Cicadina taken in 10 sample areas of the Park from 1947 to 1951.

1410. KARPIŃSKI, J. J. Ryjkowce (Curculionidae) w biocenozie Białowieskiego Parku Narodowego. [**Curculionidae in the biocoenosis of the Białowieża National Park.**] *Roczn. Nauk leśn.* 21, 1958 (29–47). 18 refs. [Pol.russ.e.]

Using 7 different methods, 8836 specimens of Curculionidae (105 species) were collected. The high *Carpinetum typicum* had 43 species, the low *Querceto-Carpinetum* 34, the *Pinetum typicum* 31, the *Querceto-Piceeto-Pinetum* 29, the *Piceeto-Pinetum* 27, the *Pinetum turfosum* 18, and the *Fraxineto-Piceeto-Alnetum* 14. The *Pinetum* biotopes yielded 81·5% of the total catch. The frequency of the various species throughout the year was determined, and the extent of damage examined. *Strophosomus rufipes* (69% of the total catch) is the only species that might endanger the Park, and research on it is advocated.

15. Animal Ecology. Game and Fish Management, Hunting, Shooting and Fishing

See also Nos. 1874, 1912, 2029–42, 2055, 2058–9, 2105.

1411. NOVIKOV, G. A. Elovye lesa kak sreda obitanija i rol' v ih žizni mlekopitajuščih i ptic. [**Spruce forests as a habitat, and the rôle of mammals and birds in their life.**] In *Rol' životnyh v žizni lesa*, Izdatel'stvo Moskovskogo Universiteta, Moscow. 1956. pp. 6–165. 160 refs. [Russ.] B.A.P.

A detailed analysis of the biocoenosis of the Spruce forests in the extreme N.W. of the U.S.S.R., covering climate, microclimate, species composition of mammals (23) and of birds (88), population densities and fluctuations, food resources and their effects on the populations, and the effect of mammals and birds on the forests. Particular attention is paid to the economically valuable species such as martens.

1412. KOŠKINA, T. V. Izmenenie fauny v usyhajuščih dubnjakah i rol' nasekomojadnyh ptic v žizni ètih lesov. [**Faunal changes in dying Oak stands, and the rôle played by insectivorous birds in the life of these stands.**] In *Rol' životnyh v žizni lesa*, Izdatel'stvo Moskovskogo Universiteta, Moscow. 1956. pp. 166–216. 26 refs. [Russ.] B.A.P.

1413. KERZINA, M. N. Vlijanie vyrubok i garej na formirovanie lesnoj fauny. [**The influence of fellings and burns on the composition of the forest fauna.**] In *Rol' životnyh v žizni lesa*. Izdatel'stvo Moskovskogo Universiteta, Moscow. 1956. pp. 217–304. 163 refs. [Russ.] B.A.P.

Gives data mainly on the species of birds and Muridae found at various stages of natural revegetation after a large forest fire near Moscow.

1414. BRUNS, H. Untersuchungen zur Siedlungsdichte der Vögel in Fichtenwäldern. [**Studies on population density of birds in Spruce forests.**] *Repr.* from *Ornithologische Mitteilungen* [*Göttingen*] 9, 1957 (241–53). 18 refs. [G.]

Presents results from different parts of Germany on the effect of e.g. food supplies, weather, suitable nesting sites, and size of area, on nesting density and successful rearing of broods, for different species.

1415. THIELE, H.-U. Die Vogelbestände zweier Waldtypen des Bergischen Landes. [**The bird population of two forest types of the Bergische Land.**] *Waldhygiene* 2 (7/8), 1958 (201–23). 40 refs. [G.g.]

Bird densities were much greater in forests of the *Querceto-carpinetum* (*a*) than in those of the *Fagetum-Quercetum petraeae* (*b*). The difference is attributed less to differences in food supply than to better nesting conditions in the richer shrub and ground vegetation of (*a*). Species composition differed little; general and insect feeders made up ca. 40%.

1416. TURČEK, F. J. Ergebnisse von Vogelansiedlungs-Versuchen in zwei Waldtypen der Slovakei. [**Results of trials with nesting boxes in two forest types in Slovakia.**] *Waldhygiene* 2 (7/8), 1958 (224–9). [G.]

Out of ca. 100 boxes hung in March in a forest of mainly *Quercus cerris*, ca. 90% produced broods totalling 583 fledglings in the first year; in a Silver Fir/hardwood forest ca. 40%, with 226 fledglings. No data on the effect on insect populations are available.

1417. GÖSSWALD, K. Über die Auswirkungen von Spechten auf die rote Waldameise. [**The effect of woodpeckers on *Formica rufa*.**] *Waldhygiene* 2 (7/8), 1958 (234–51). 16 refs. [G.]

Describes the depredations of various species of woodpecker, which frequently check and even destroy whole colonies of ants' nests, and discusses protection by wire netting, slash etc. Other activities of woodpeckers discussed include the pecking of holes to find *Camponotus herculeanus*, holing or barking of stems and twigs for their sap etc.

1418. VANĚK, J. Úživnost bukových podrostů pro zvěř. [**Beech regeneration as browse for game.**] *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (5), 1958 (329–40). 11 refs. [Cz.cz.russ.g.]

The changes throughout the year in the supply of browse available [to deer?] in Beech regeneration were investigated by simulated browsing. The minimum twig weight was found in Nov., the maximum leaf weight in May. New leaves grew in the same growing season only if defoliation took place before August. They were always lighter and smaller than normal leaves, and were formed within 45–55 days of defoliation in May–June. Results so far indicate that Beech regeneration provides quantitatively better browse than Spruce.

1419. HARRY, G. B. **Winter food habits of moose in Jackson Hole, Wyoming.** *J. Wildlife Mgmt.* 21 (1), 1957 (53–7). 4 refs. B.A.P.

A study during the 1953–54 winter showed that Willow (*Salix* spp.) constituted 75% of the winter food taken.

1420. BURCALOW, D. W., and MARSHALL, W. H. **Deer numbers, kill, and recreational use on an intensively managed forest.** *J. Wildlife Mgmt.* 22 (2), 1958 (141–8). 8 refs. B.A.P.

Reviews the history of a conflict between forestry and deer preservation on the Cloquet Experimental Forest, Minn., and the resolution of this conflict by regulating hunting and thereby keeping deer populations at a level not injurious to the forests.

1421. Doctrine de l'administration en matière de chasse et de faune sauvage. [**Official policy [for the Belgian Congo] on hunting and wild fauna.**] *Bull. agric. Congo belge* 49 (4), 1958 (1094–119). [F.Du.]

Covers the importance of protecting natural resources, particularly game (as food for Africans), and objectives (maintenance of stock, control of their depredation, study of game and hunting). The forest department is being reorganized to administer this policy and each officer will have to be competent in hunting, fishing and fish culture as well as forestry.

16. General Botany

160. Plant Chemistry

See also Nos. 1377–8, 1439, 1554, 1569, 1801–3, 1932–3, 2315 *et seq.*, 2601 *et seq.*

1422. HARTSHORNE, J. N. **Pigmentation and sexuality in plants.** *Nature, Lond.* 182 (4646), 1958 (1382–3). 10 refs.

A study of anthocyanidins from ♂ and ♀ flowers of dioecious plants (including *Myrica gale* and *Salix repens*) strengthens the view that anthocyanins have no direct connexion with sexual differentiation, and that the differences reported for some species of *Casuarina* are not representative of some more general phenomenon.

1423. HILLIS, W. E. **Formation of condensed tannins in plants.** *Nature, Lond.* 182 (4646), 1958 (1371). 12 refs.

[Cf. *F.A.* 18 No. 933; 19 Nos. 2319, 5004.] Reviews a number of studies (particularly on

Eucalyptus spp.), and concludes that it is probable that condensed tannins in many woody plants are formed by the polymerization of leucoanthocyanins, either alone or in conjunction with catechin and other compounds.

1424. SANDERMANN, W., and STOCKMANN, H. Untersuchungen über die Biogenese von Terpenen und Terpenoiden mit markierten Verbindungen. I. Darstellung der radioaktiven Ausgangssubstanzen β, β-Dimethyl-acrylsaüre, Geraniumsäure, Farnesylsaure und ω-Geranyl-geraniumsäure. II. Über die Biogenese von Pulegon. III. Über die Biogenese der Coniferenharzsäuren. **[Research on the biogenesis of terpenes and terpenoids with labelled compounds. I. Preparation of the radioactive original substances β, β-dimethyl-acrylic acid, geranic acid, farnesenic acid, and ω-geranyl-geranic acid. II. The biogenesis of pulegone. III. The biogenesis of the resin acids of conifers.]** *Repr.* from *Chem. Ber.* 91 (5), 1958 (924–37). 46 refs. [G.]

1425. HROMATKA, O., BRÖLL, W., and STENTZEL, L. **The phytol content of plants.** *Monatshefte für Chemie, Wien* 89, 1958 (126–9). [G.?] From *abstr.* in *Chem. Abstr.* 52 (19), 1958 (16491–2). P.R.

The phytol content of leaves of *Aesculus hippocastanum* increases from almost nil in the bud to a maximum in the formed leaf (0·3% dried leaf material) which does not decrease till the leaves have fallen.

161. Physiology

See also Nos. 1422, 1458–60, 1476–7, 1485, 1533 *et seq.*, 1713, 1716, 1719, 1723, 1752–4, 1809, 1871, 1873, 1914, 1932–3, 1954, 1996, 2048.

1426. RICHARDSON, S. D. **The first International Symposium on Tree Physiology.** *Forestry* 31 (2), 1958 (177–83). 4 refs.

Considers briefly the main points made at the symposium held at Harvard in April 1957; remarks on the serious gaps in our knowledge of tree physiology revealed by the discussion; and regrets that professional foresters should have been so thinly represented at the symposium.

1427. GREENIDGE, K. N. H. **Moisture movement in plants.** *Repr.* from *Scientia, Asso* (*Ser. 6*) July, 1958. pp. 5. [E.] X.

States various current hypotheses on the mechanism of the upward transfer of water in plants. [Cf. *F.A.* 17 Nos. 122–3.]

1428. GREENIDGE, K. N. H. **A note on the rates of upward travel of moisture in trees under differing experimental conditions.** *Repr.* from *Canad. J. Bot.* 36, 1958 (357–61 + 1 plate). 5 refs.

Tabulates data on the rate of moisture movement after injection with a dilute aqueous solution of acid fuchsin, in *Acer saccharum, A. rubrum, Betula lutea, Fagus grandifolia, Ulmus americana* and *Populus balsamifera*, for controls and for trees that (*a*) were half sawn through at two levels, (*b*) had the stem severed at its base immediately before injection and maintained in an upright position, (*c*) combined (*a*) and (*b*), or (*d*) were root-pruned 12 weeks before injection.

1429. MARSHALL, D. C. **Measurement of sap flow by heat transfer.** *Nature, Lond.* 182 (4639), 1958 (878–9). 3 refs.

Explains equations for heat conduction, on which is based a sap-flow meter consisting of a piece of nichrome resistance wire lying along a branch diameter, through which a current up to 40 amp. is passed to provide the heat pulse. The temperature is measured at some distance 'downstream' (usually ca. 1·5 cm.) by a thermistor in the tip of a hypodermic needle. The quantity of heat in the pulse is chosen to give a max. rise in temperature at the needle of ca. 0·3° C. Experiments have so far been confined to conifers, i.e. woods with a fine-structured, thermally homogeneous xylem. With *Pinus radiata*, provided that the thermistor is deeper than ca. 0·5 cm. in the sapwood, the curve of temperature rise against time agrees closely with that predicted by equation. It was also found that dye travels through the xylem of *P. radiata* at speeds up to 4 times greater than the heat-pulse velocity. Full details of the investigations are to be published later. [Cf. *F.A.* 20 No. 2123.]

1430. CLOSS, R. L. **The heat pulse method for measuring sap flow in a plant stem.** *N.Z. J. Sci.* 1 (2), 1958 (281–8). 3 refs. P.R.

Discusses the theory and technique of the method, in which heat is injected into the stem through a single turn of resistance wire wound round it and the time taken for the heat pulse to reach a point higher in the stem is measured. A satisfactory agreement between observed and estimated rates of flow was obtained when the method was applied (*a*) to an excised Poplar twig through which water was passed by a hand-operated pump, and (*b*) to a growing *Salvia* plant.

1431. DVORECKAJA, E. I., and KAZUTO, O. N. Nekotorye osobennosti vodnogo režima odnoletnih i dvuhletnih sejancev vjaza obyknovennogo i duba čereščatogo. **[Some features of the water relations of one- and two-year seedlings of *Ulmus campestris* and *Quercus robur*.]** *Fiziol. Rast.* 5 (4), 1958 (363–5). 7 refs. [Russ.] A.P.B.

In the summers of 1952 and 1953 the transpiration of one- and two-year-old Oak and Elm seedlings grown in pots at different soil-moisture contents was measured by repeated weighing. Evaporation from the soil surface was prevented by a cover of paraffin-waxed paper. Transpiration rose with increasing soil m.c.: the mean daily rate for Oak from 0·74 g./sq. dm./hour at 40% of saturation to 0·93 at 80% of saturation, and for Elm from 1·32 to 1·54 g./sq. dm./hour. In general, the daily course of transpiration was correlated with meteorological factors. The transpiration rate was consistently much higher for Elm than for Oak; Elm also showed a greater number of open stomata and a greater width of stomatal opening throughout the day, although the degree of stomatal opening and the transpiration rate at any particular time were not always well correlated in either species.

1432. BESKARAVAJNYJ, M. M. Transpiracija srosšihsja sosen. **[The transpiration of root-grafted *Pinus sylvestris*.]** *Fiziol. Rast.* 5 (4), 1958 (366–8). 4 refs. [Russ.] A.P.B.

In summer 1955, measurements were made by the rapid weighing method of the transpiration rate of a group of 3 root-grafted Pines (4–9 m. high) and one control tree (6 m. high) at Kamyshin [cf. *F.A.* 18 Nos. 3791–2]. The root-grafted Pines had a considerably higher transpiration rate, the maximum (300 mg./sq. dm. of leaf area/hour) being 3 times that of the maximum for the control.

1433. RAHTEENKO, I. N. O peremeščenii mineral'nyh pitatel'nyh veščestv iz odnogo rastenija v drugoe pri vzaimodejstvii ih kornevyh sistem. **[On the transfer of mineral nutrients from one plant to another owing to interaction between their root systems.]** *Bot. Ž.* 43 (5), 1958 (695–701). [Russ. russ.]

Describes field investigations and pot trials in which radio-active P applied (as K_2HPO_4 solution) to leaves of 2- to 15-year-old trees (species of *Quercus*, *Acer*, *Tilia*, *Picea*, *Larix*, *Betula*, *Fraxinus* and *Pinus*), was observed to be transferred to trees 0·25–2 m. distant, of the same or of other species and genera. This transference took place not only through natural root-grafts but also through root contacts and perhaps via the soil solution between roots in proximity. In many cases, more active transference was found between different genera than between trees of the same species. Results are tabulated, and stress is laid on the importance of such work in connexion with the choice of species for mixtures.

1434. RAHTEENKO, I. N. O sezonnom cikle pogloščenija i vydelenija mineral'nyh pitatel'nyh veščestv kornjami drevesnyh porod. **[The seasonal cycle of uptake and excretion of mineral nutrients by the roots of tree species.]** *Fiziol. Rast.* 5 (5), 1958 (447–50). 5 refs. [Russ.] A.P.B.

Observations were made 4 times during the growing season in 1954 and 1955 on the uptake and excretion through the roots of P^{32}, introduced (as K_2HPO_4; via leaves or roots) into 2-year-old plants of Oak, Lime, Birch and Pine grown in sand cultures. The maximum and minimum rates of uptake and excretion occurred in different species at different times of the growing season. The maximum daily P uptake by Oak and Birch, coinciding with the minimum uptake by Lime and Pine, was in early June. The maximum uptake by Lime and Pine was in July, when uptake by Oak and Birch had decreased sharply. Amounts of P excreted through the roots were much greater for Lime and Pine than for Oak and Birch. In all species the rate of excretion varied with time of year, and the maximum P uptake by Oak and Pine was concurrent with maximum excretion of P by Lime and Birch. It is concluded that mixed Oak/Lime and Pine/Birch stands will make lower demands upon the soils than pure stands of these species.

1435. HOTJANOVIČ, A. V. Nekotorye osobennosti obmena veščestv v kornjah sosny v zavisimosti ot stepeni aeracii počvy. **[Some features of the root metabolism of Scots Pine in relation to soil aeration.]** *Fiziol. Rast.* 5 (5), 1958 (455–7). 18 refs. [Russ.] A.P.B.

In Sept. 1955, chromatographic analyses of the root xylem sap of Pines in N. Russia growing in (*a*) anaerobic (i.e. fully waterlogged), (*b*) semi-anaerobic (waterlogged below the rooting zone; soil saturated with moisture) and (*c*) aerobic (water-table at 1 m.) conditions showed that the number of amino-acids increased in proportion to the degree of soil aeration; sap from roots in (*a*) showed only one (a little glycine), whereas six amino-acids were present in that from roots in (*c*). As regards foliage constituents, the amount of chlorophyll *a* and *b* was reduced by 15% and the non-protein N content was higher in trees from (*a*) as compared with those from (*c*).

1436. MACDONALD, I. R., and DEKOCK, P. C. **The stimulation of leaf respiration by respiratory inhibitors.** *Physiol. Plant., Copenhagen* 11 (3), 1958 (464–77). 32 refs. [E.e.]

On dwarf shoots of Larch, all needles of which are of the same age, respiration during the growing seasons of 1956 and 1957 was inhibited most by KCN in spring—up to 80%; then inhibition dropped gradually, reaching a minimum of ca. 20–30% by the end of July, after which it increased somewhat. On 1- to 4-year-old Cedar (*C. atlantica*, *C. libani*) needles, inhibition of respiration by KCN was 80–90% on the first year's needles but fell to between 10·3% and nil in 3- to 4-year-old needles. It is claimed that the sensitivity of leaf tissue to heavy metal inhibitors is significantly lessened by age and may therefore be predicted from the position of the leaf on the stem.

1437. BOURDEAU, P. F. **Relation between growth and unit rate of photosynthesis.** *Proc. 5th Ntheast. For. Tree Impr. Conf., Orono 1957*, 1958 (58–62). 12 refs.

Reviews briefly English and German literature on using photosynthesis measurements to select potentially fast-growing individual trees, and concludes that the method has certain serious limitations (e.g. the difficulty of measuring a steady rate of photosynthesis under test conditions), and that more work must be done to ascertain its value.

1438. BOURDEAU, P. F. **Photosynthetic behaviour of sun- and shade-grown leaves in certain tolerant and intolerant tree species.** *Abstr.* in *Bull. ecol. Soc. Amer.* 39 (3), 1958 (84). A.P.B.

Light curves of photosynthesis were determined by means of an infra-red gas-analysis technique, for leaves of seedlings grown under various degrees of shading. In *Pinus resinosa* and *P. strobus*, shade-grown needles had higher photosynthetic rates per unit needle-weight than sun-grown needles, at all light intensities. Shade-grown needles of Red Pine had a lower compensation point and were relatively more efficient in weak light. The light curves of *Tsuga canadensis* needles were similar in all shading treatments. Hemlock was more efficient in weak light than either Red or White Pine. Chlorophyll and N contents of the leaves generally increased with increasing shading. Photosynthetic yields per unit amount of chlorophyll were not affected by the shading treatments in the Pines but they were reduced by shading in Hemlock. Leaves of

Ailanthus altissima exhibited a negative adaptation to light intensity. *From author's summary.*

1439. NEISH, A. C. **Seasonal changes in metabolism of Spruce leaves.** *Canad. J. Bot.* 36 (5), 1958 (649–62). 37 refs. O.R.S.

Sucrose, raffinose, pinitol, shikimic acid and pungenin were isolated in crystalline form from twigs of *Picea pungens* and *P. glauca.* Seasonal variations in the amounts of these substances are discussed. Data are given on photosynthesis of cuttings of these species fed with $C^{14}O_2$ in laboratory conditions at different seasons.

1440. HACSKAYLO, J., and MURPHEY, W. K. **Response of 9-year-old McKee hybrid Poplar to gibberellic acid.** *Res. Circ. Ohio agric. Exp. Sta.* No. 54, 1958. pp. 8. 3 refs.

A plot of 9-year-old 'McKee' hybrid Poplars (*Populus trichocarpa* × *P. angulata*), 32·2–46·5 ft. high and 3·33–8·94 in. d.b.h., were treated with a solution of the K salt of gibberellic acid introduced directly into the xylem at concentrations of 0, 10, 30, 60, 100 and 1000 p.p.m. In each of 5 replications, one tree was treated at each concentration with 100 ml. of solution. The juvenile leaves of trees treated with the 3 highest concentrations recurved and wilted. There were no significant differences between treatments during the normal growing season, in height, diameter or duration of growth. Dormancy was broken during Sept. by the 3 higher concentrations. The study suggests that gibberellic acid is readily translocated throughout the vascular system, and that a lower concentration will break dormancy in autumn than that required to alter the activity of cambium and apical meristem during the normal growing season.

1441. RADLEY, M., and DEAR, E. **Occurrence of gibberellin-like substances in the coconut.** *Nature, Lond.* 182 (4642), 1958 (1098). 7 refs.

Extracts from the milk, endosperm, and embryos of mature coconuts were tested on pea seedlings, and gibberellin-like activity was found in all parts. The activity of the extract of the embryos was remarkably high.

1442. HEMBERG, T. **The occurrence of acid inhibitors in resting terminal buds of *Fraxinus*.** *Physiol. Plant., Copenhagen* 11 (3), 1958 (610–4). 16 refs. [E.e.]

An acid inhibitor, identified by chromatography as inhibitor B, was found in dormant terminal buds of *F. excelsior* f. *pendula.* The inhibitor disappears during the winter as the buds break dormancy.

1443. MOLOTKOVSKYJ, G. H., and BOBYR, N. U. Javyšče poljarnosti i rozpodil askorbinovoji kysloty v roslynah smereky, jalyny i sosny. **[Polarity and ascorbic-acid distribution in Fir, Spruce and Pine.]** *Ukrajins'kyj Biohimičnyj Žurnal, Kyjiv* [*Kiev*] 29 (1), 1958 (119–23). 8 refs. [Ukr.russ.e.] N.L.L.

Investigations on *Abies alba, Picea abies* and *Pinus stankewiczii* showed that the ascorbic-acid content (a.a.c.) of the bark increases from bottom to top of each internode of the stem and branches. In the stem needles of Pine, and in the branch needles of Fir and Pine, the a.a.c. increases in the same direction as in the bark, but in stem needles of Spruce and Fir, and in branch needles of Spruce, it increases in the reverse direction, i.e. from top to bottom. Taking the stem and branches of the plants as a whole, the a.a.c. of the bark increases centrifugally and that of the needles centripetally.

1444. KONAR, R. N. **Effect of IAA and kinetin on pollen tubes of *Pinus roxburghii* Sar.** *Curr. Sci.* 27 (6), 1958 (216–7). 6 refs. O.B.D.

A greater accumulation of starch in pollen tubes of *P. roxburghii* when supplied with kinetin and IAA suggests that these chemicals probably enable them to absorb larger quantities of sugars from the medium and convert it to starch.

164. Morphology

See also Nos. 1485, 1555, 1561–2, 1581.

1445. SZYMANOWSKI, T. Cypryśnik błotny (*Taxodium distichum* Rich.) i jego występowanie w naszych parkach. **[*T. distichum* in Polish parks.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (225–38). 24 refs. [Pol.russ.e.]

Reviews literature on the paleobotany of the species, and on certain morphological features, especially the pneumathodia. Also describes briefly the Polish specimens of *T. distichum*, only 5 of which exhibit pneumathodia.

1446. LJAŠENKO, N. I. O spjaščih počkah kustarnikov. **[On the dormant buds of shrubs.]** *Bot. Ž.* 43 (7), 1958 (1039–47). 19 refs. [Russ.]

An anatomical study of *Syringa vulgaris, Lonicera tatarica, Crataegus rotundifolia, Philadelphus coronarius,* and *Caragana arborescens,* comparing the results with observations on some tree species.

1447. SZCZERBIŃSKI, W., and SZYMAŃSKI, S. Proleptyczne i sylleptyczne pędy młodej sosny zwyczajnej (*Pinus silvestris* L.). **[Proleptic and sylleptic shoots of young *P. sylvestris*.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (421–31). 8 refs. [Pol.russ.g.]

Proleptic shoots arise from fully formed terminal buds after a period of dormancy, grow to a length of usually > 10 cm., and then form a group of buds. Sylleptic shoots arise in spring as new whorls on leading or side shoots which keep on growing. Ways of distinguishing proleptic and sylleptic shoots are discussed.

1448. ZUCCONI, L. Observaciones sobre la morfología de la inflorescencia en tres especies de *Eucalyptus.* **[Morphology of the inflorescences in three Eucalypt species.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 220–200, 1957. pp. 3 + 2 plates. [Span.span.]

E. rostrata, E. botryoides and *E.* × *trabuti.*

1449. KLAEHN, F. U. **Some interesting aspects of flower morphology and flower ecology of various forest trees.** *Proc. 5th Ntheast. For. Tree Impr. Conf., Orono 1957,* 1958 (71–6). 11 refs.

Discusses evolutionary tendencies in the flower morphology of some genera, particularly *Fraxinus* and *Acer.*

1450. NEČAEV, A. P. Rol' čečeviček v formirovanii peridermy u *Phellodendron amurense* Rupr. **[The rôle of lenticels in the development of periderm in *P. amurense*.]** *Bot. Ž.* 43 (10), 1958 (1460–2). [Russ.]

Traces the development of lenticels in *P. amurense* and the part they play in cork formation.

165.3/.7. Heredity, Genetics and Breeding; Variation

See also Nos. 1437, 1486–7, 1495, 1546, 1575, 1585, 1696, 1710, 2053, 2275, 2350, 2357, 2554.

1451. STERN, K. Populationsgenetische Probleme in der Baumrassenforschung und Forstpflanzenzüchtung. **[Problems of population genetics in research on tree races and in forest tree breeding.]** *Schweiz. Z. Forstw.* 109 (8/9), 1958 (458–77). 44 refs. [G.f.]

A presentation of the basic principles and concepts involved, particularly those of variation and race, and a discussion of theoretical and technical problems in research and experimentation, with examples from the literature.

1452. BOUVAREL, P. Les repeuplements artificiels—conséquences d'ordre génétique. **[The genetic consequences of artificial regeneration.]** *Schweiz. Z. Forstw.* 109 (8/9), 1958 (524–36). [F.g.]

Discusses chiefly the dangers that may threaten highly adapted local races of superior quality through crossing with neighbouring artificially established stands of different provenance, and changes brought about by natural selection in stands established under ecological conditions different from their place of origin, e.g. isolated Maritime Pines that have survived severe frosts in northern parts of France while the rest of the stands were killed.

1453. SCHREINER, E. J. **Possibilities for genetic improvement in the utilization potentials of forest trees.** *Silvae Genet.* 7 (4), 1958 (122–8). 46 refs. [E.]

A discussion, with an extensive bibliography from 1930 onwards.

1454. **Proceedings, 5th Northeastern forest tree improvement conference 1957.** Northeastern Forest Tree Improvement Conference, Orono, Me. 1958. pp. 86.

Contains a section with papers by various authors summarizing forest tree improvement work in the U.S.A. and Canada; and a section of research reports including: The possibilities of Norway Spruce in Maine (*R. I. Ashman*); Air-layering of Norway Spruce and Blue Spruce (*F. Mergen*) [see *F.A.* 19 No. 2951]; An outline of Spruce improvement research at the Lake States Forest Experiment Station (*P. O. Rudolf* and *H. Nienstaedt*); and Natural selection of blight-resistant American Chestnuts appears promising (*J. D. Diller*). Some research reports are noticed separately in this issue of *F.A.*

1455. LARSEN, C. S. Angewandte Genetik im Waldbau. **[Applied genetics in silviculture.]** *Schweiz. Z. Forstw.* 109 (8/9), 1958 (433–57 + 1 photo). [G.f.]

Discusses the principles of genetic improvement in forestry and the techniques employed—provenance trials, grafting, controlled pollination, seed orchards etc. with examples of heterosis (Larch), emergence of disease-resistant individuals (Oak, Douglas Fir, *Thuja plicata*) etc. Advocates the preservation and propagation of genetic material from natural stands. [Cf. *F.A.* 18 No. 98.]

1456. NIKITIN, I. N. Novoe v biologii nekotoryh lesnyh porod i drevostoev. **[New points on the biology of some tree species and stands.]** *Lesn. Hoz.* 11 (2), 1958 (18–20). [Russ.]

Measurements of (*a*) five 80-year *Picea abies* naturally root-grafted some 50 years earlier to a *Pinus sylvestris* now ca. 100 years old, showed a mean tree volume of 0·6 cu.m. for the Spruce, while that of (*b*) comparable trees not root-grafted, was 0·445 cu.m. Cross-sections of the needles of (*a*) showed no resin canals, whereas those of (*b*) always had 2 large canals. The Pine had up to 18 resin canals in its needles compared with 6–10 for Pines without root-grafts. Differences were also noted between the needle lengths, weights and moisture contents of (*a*) and (*b*), and a natural 'vegetative hybridization' operating by means of substances in the sap is postulated, which is held to account for the greater increment of Pine/Spruce stands compared with pure stands of either species, and is believed to occur far more commonly than has been supposed. The author tried artificial intergeneric stem grafting of several conifers, the following combinations being the most successful: (1) Spruce on Larch, Scots Pine, and *Pinus sibirica*, (2) Scots Pine on Larch and Spruce, (3) Larch on Scots Pine, Spruce and *Pinus sibirica*. The possibilities of using 'vegetative hybrids' in tree breeding are discussed.

1457. VINCENT, G. Lärchentypen in Mitteleuropa. **[Types of Larch in Central Europe.]** *Schweiz. Z. Forstw.* 109 (8/9), 1958 (506–19 + 1 plate). 53 refs. [G.f.]

A review, with special reference to the author's work in Moravia, indicating the existence of altitudinal ecotypes among Sudeten, Carpathian and Alpine Larches, the low-level Larches everywhere being faster growing, but less hardy in youth, than those from high levels.

1458. LEIBUNDGUT, H. Untersuchungen über das photoperiodische Verhalten von Fichtenkeimlingen. **[The photoperiodic behaviour of very young Spruce seedlings.]** *Schweiz. Z. Forstw.* 109 (8/9), 1958 (520–3). [G.f.]

To elucidate the question whether all Spruce from the Swiss flysch region represent one ecotype, the photo-response of seeds from 6 provenances, sown in April in a clayey loam and a flysch clay (in pots) was investigated. Evaluation of hypocotyl lengths in June revealed no significant differences between provenances in response to normal daylight, and to 16 and 24 hours' illumination, but germination % and dry needle weight increased with day-length and differed significantly between provenances. All 3 values were greater on the loam than on the clay soil.

1459. McWILLIAM, J. R. **The role of temperature in pollen germination of *Pinus* and its bearing on controlled pollination practices.** *Proc. 5th Ntheast. For. Tree Impr. Conf., Orono 1957*, 1958 (63–7). 14 refs.

Germination and tube growth of *Pinus nigra* pollen, studied *in vitro* under a wide range of temperature conditions, was best at 30–32° C. Upper and lower temperature limits for germination were determined, but these limits, particularly the lower, could be extended by incubation at alternating temperatures for 8-hour periods. The germinative capacity of the pollen was permanently affected by too high temperatures, but by low temperatures only during the critical imbibition phase. Field studies recording cone temperatures inside pollination bags of sausage casing in hot weather showed that temperatures on the exposed part of the crown rose to a point lethal to pollen in the laboratory experiments. By protecting bags from direct insolation, e.g. covering with kraft bags or applying some type of reflecting paint, temperatures can be kept within reasonable limits.

1460. SCHÜTT, P. Züchtung mit Kiefern. Teil I. Individualunterschiede und Provenienzversuche. **[Pine breeding. Part I. Individual differences and provenance trials.]** *Mitt. BundesforschAnst. Forst- u. Holzw.* No. 40, 1958. pp. 65. Many refs. [G.g.]

A review of literature aiming at (but not claiming) comprehensiveness, up to and including 1956, covering: biology of reproductive organs, including age of mother tree; inheritance of morphological and physiological characters; and provenance trials with *Pinus densiflora, P. thunbergii, P. nigra, P. pinaster, P. sylvestris, P. banksiana, P. contorta, P. ponderosa, P. resinosa, P. strobus, P. caribaea, P. echinata, P. taeda* etc. Each section carries its own summary and bibliography. Part II is to cover cross-breeding, resistance breeding and cytology.

1461. WRIGHT, J. W., and GABRIEL, W. J. **Species hybridization in the Hard Pines, series *Sylvestres*.** *Silvae Genet.* 7 (4), 1958 (109–15). 20 refs. [E.e.f.g.]

Fifty-five species crosses (including reciprocals and back crosses) were attempted at the Northeastern Forest Experiment Station during 1948–56. Twenty-three of these crosses yielded hybrids that have been authenticated in the nursery or in permanent test plantings. The American *Pinus resinosa* failed to cross with any other species. The Japanese *P. thunbergii* and *P. densiflora* crossed easily with each other and with several Chinese and Formosan species. Crosses between the European *P. nigra* and *P. sylvestris* yielded a few hybrids, as did the crosses involving a European and a Japanese species. Two-year-old seedlings of *P. thunbergii* × *P. densiflora*, *P. thunbergii* × *P. taiwanensis*, *P. thunbergii* × *P. massoniana*, *P. thunbergii* × *P. nigra* var. *austriaca*, *P. densiflora* × *P. thunbergii*, *P. densiflora* × *P. sylvestris*, *P. nigra* var. *austriaca* × *P. thunbergii*, and *P. nigra* var. *austriaca* × *P. densiflora* were taller than non-hybrid seedlings from the same parents. The diagnostic characteristics of these and other hybrid combinations are reported. Selfed progenies of *P. thunbergii* and *P. densiflora* were markedly smaller than crossed progenies of these species. Cone sets and sets of empty seeds were as high with year-old as with fresh pollen, but the sets of filled seed were much less with the year-old pollen. *From authors' summary.*

1462. WETTSTEIN, W. Rassen- und Züchtungsforschung bei *Pinus silvestris*. **[Provenance and breeding research with *P. sylvestris*.]** *Schweiz. Z. Forstw.* 109 (8/9), 1958 (495–505). 11 refs. [G.f.]

Discusses hereditary characters (stem, needle and bark forms, photoperiodism, growth rhythm, disease resistance etc.), distinguishing local races and individual trees, and summarizes earlier research by the author and his collaborators, particularly tests at Müncheberg (Brandenburg) in the 1930's in which the progenies of 100 selected open-pollinated local trees were compared with each other and with those from mixed seed from the whole stand. Marked differences in early height growth and mortality were found [cf. *F.A.* 16 No. 3954], and in these and later tests at Mariabrunn two trees were found whose progeny was resistant to *Lophodermium pinastri*. In some instances vigorous hybrids were obtained from intraspecific crosses. Natural and artificial hybrids of *P. sylvestris* and *P. nigra* were investigated at Mariabrunn, with special reference to resin properties, and other research into resin production is described [cf. *F.A.* 14 No. 992; 19 No. 2728]. Another series of tests showed the existence of differences in shade tolerance between German provenances. The relation of seed shape, seed weight etc. of provenances and trees to seedling characteristics is discussed, particularly the correlation found to exist between seed weight and number of cotyledons. It is thought, however, that none of the tests for early recognition of future characteristics is as yet of practical importance [cf. *F.A.* 16 No. 1420]. Finally, research on light and thermal influences [cf. *F.A.* 16 No. 3865] is described.

1463. PATTON, R. F., and RIKER, A. J. **Blister rust resistance in Eastern White Pine.** *Proc. 5th Ntheast. For. Tree Impr. Conf., Orono 1957*, 1958 (46–51).

Graft and seedling progenies of 163 possibly resistant *Pinus strobus* from several infection centres in Wisconsin, studied in 1942–55, produced 40 highly resistant strains when exposed to natural and artificial infection, a major factor being the ability to 'cork out' the pathogen in necrotic tissues. The amount of infection was much less on graft material than on seedlings and was related to the physiological age of the graft, whereas seedlings from resistant parents proved hardly more resistant than the controls. When planted out, graft plants showed poor survival, an abnormal, spindly growth habit, and slow diameter increment. Experiments in progress include controlled pollination between resistant trees and related soft Pines, induction (by grafting) of early flowering in first-generation seedlings, and various methods of vegetative propagation.

1464. MOFFETT, A. A., and NIXON, K. **Genetical studies in Acacias. II. Leaf characters in hybrids**

between Black and Green Wattles. *Heredity* 12 (2), 1958 (199–212 + 1 plate). 5 refs. O.R.S.

[Cf. *F.A.* 18 No. 121.] (1) Hybrids between Green [*Acacia decurrens*] and Black [*A. decurrens* var. *mollissima*] Wattles can be produced relatively easily, but show a considerable reduction of fertility compared with the parents. (2) Four leaf characters selected for detailed study appeared to be polygenic in inheritance, but significant differences between F_1 trees from the same parents occurred for all 4 characters. These differences tended to persist in the F_2 and back-crossed families, showing a parent-progeny correlation. (3) Recombination of the characters of the two parents does not take place at random, but there is a marked tendency for characters coming in from one species to remain associated. For some characters there are, however, abrupt changes in the correlation value between F_2 families derived from the same original parents. (4) Because of the blending nature of polygenic characters and the tendency for parental characters to remain associated, it is concluded that, unless some desirable character controlled by major genes is detected in Green Wattle, a large-scale breeding experiment to attempt to combine the qualities of the two species is not justified. *Authors' summary.*

1465. BLINKENBERG, C., *et al.* **Controlled pollination in *Fagus*.** *Silvae Genet.* 7 (4), 1958 (116–22). 6 refs. [E.e.f.g.]

[Cf. *F.A.* 15 No. 2337.] Reports further observations and experiments at the Hørsholm Arboretum. It has been found advantageous to mix large quantities of *Lycopodium* spores with the small quantities of *Fagus* pollen available. Further experiments confirmed that *F. sylvatica* is usually highly self-sterile, although there are certain exceptions. Seedlings have been raised of the cross *F. sylvatica* ♀ × *F. grandifolia* ♂. They show intermediate leaf characters and a tendency towards hybrid vigour in comparison with *F. sylvatica*. Four 1-year-old hybrids of the cross *F. sylvatica* ♀ × *F. sieboldii* ♂ were also obtained. A method is described of testing the purity of progeny after early artificial pollination without bagging, by the use of Copper Beech pollen. An approximate 1/1 segregation in the progeny after crossing ordinary with Copper Beech indicates a case of monofactorial segregation. Open-pollination studies on scattered groups of old Beech trees showed the great effectiveness of wind pollination. It is suggested that poor fertilization in a few trees was due to early flowering. *Authors' summary.*

1466. KRAHL-URBAN, J. Zur genetischen Beurteilung der Buche in den bayerischen Alpen und im Bayerischen Wald. **[The genetics of Beech in the Bavarian Alps and in the 'Bayerischer Wald'.]** *Forstwiss. Cbl.* 76 (7/8), 1957 (246–54). 9 refs. [G.]

A reply to Schmidt's criticisms [cf. *F.A.* 17 No. 3654] and a defence of the author's own earlier contentions.

1467. WRIGHT, J. W. **Possibilities of genetic improvement of the Southern bottomland hardwoods.** *Proc. 7th For. Symp. La. Sch. For.* 1958 (27–34). 16 refs.

Includes notes on breeding experiments on *Quercus*, *Populus* (including a tabulated summary of species crosses), and *Fraxinus*.

1468. BERGMAN, F., and LANTZ, A. Ein Versuch zum Treiben von Kreuzungsreisern von Aspen (*Populus tremula* L.) bei niedriger Temperatur. **[The forcing at low temperature of cut Aspen branches used for crossing.]** *Silvae Genet.* 7 (5), 1958 (155–9). 2 refs. [G.g.e.f.]

In order to avoid loss of vitality through drying-out of cut Aspen branches used for seed production, ice was experimentally introduced into the containers used at Sundmo, and the water kept constantly at a few degrees above zero. The branches remained much fresher and more vigorous than in water at greenhouse temperature. The lowering of the water temperature hindered the increase in micro-organisms that restrict the circulation of liquids in the branches. In consequence the branches developed and flowered more quickly, and the seed quality was improved. *From authors' summary.*

1469. MEYER-UHLENRIED, K.-H. Untersuchungen über die Vererbung eines anatomischen Merkmals bei Kreuzungen von Pappeln verschiedener Sektionen. **[Investigation on the inheritance of an anatomical characteristic in crosses of Poplars from different sections.]** *Züchter* 28 (5), 1958 (209–16). 20 refs. [G.g.] E.M.B.

The character selected was the mean tangential diameter of the first early vessels (adjacent to the growth-ring boundary) [cf. *F.A.* 19 No. 4744]. Significant differences were found between the *Aigeiros* (*Populus* × *robusta* and *P.* × *regenerata*) and the *Tacamahaca* (No. 5122, *P. candicans* × *P. trichocarpa*) sections, but not between the two species of the *Aigeiros* section. In F_1 hybrids between the two sections (*Populus* × 'Rochester' and No. 33, *Populus deltoides* × *P. simonii*) the *Tacamahaca* section was dominant over the *Aigeiros* in this characteristic. A clone from *P.* × *generosa* × *P.* × *serotina* also contained the dominant *Tacamahaca* gene for this characteristic.

1470. JOVANOVIĆ, B., and TUCOVIĆ, A. Prethodno saopštenje o hibridizaciji topola u 1957 godini. **[A preliminary report on Poplar hybridization in 1957.]** *Šumarstvo* 11 (5/6), 1958 (263–77). 23 refs. [Serb.e.f.]

Describes first-year growth of 23 Poplar hybrids grown in 1957 in the arboretum of the Forestry Faculty, Belgrade, from seed obtained either by controlled pollination, by open pollination conditioned by planting suitable ♂ trees around the ♀ tree, or by the cut-branch technique (water cultures). The crossings were within the sections *Leuce* and *Aigeiros* and between *Aigeiros* and *Tacamahaca*.

1471. KOPECKY, F. **Problems of breeding Black Poplar in Hungary.** *Acta Agronomica Academiae Scientiarum Hungaricae, Budapest* 6 (3/4), 1956 (307–20). 8 refs. [E.e.russ.g.] A.P.B.

Of the Poplars imported from western Europe, *Populus* × *serotina* was introduced to Hungary ca. 90, *P.* × *marilandica* ca. 70, and *P.* × *robusta* ca. 40 years ago. The parents of these, coming from more

northerly latitudes, were adapted to a longer day-length than that in Hungary, consequently their utilization of the growing season is much inferior to that shown by the native species. Good results from breeding have been obtained mainly with intraspecific, intravarietal and interspecific crosses with native *P. nigra*. The hybrids are free of the disadvantages mentioned, and their initial growth is excellent. The following conclusions may be drawn from the breeding experiments: (1) It is not possible to combine the growth rate of young Balsam Poplar with the lasting vigour of Black Poplar, by interspecific crossings. (2) In order to obtain clones that can be easily propagated from cuttings, one parent with good rooting ability should be selected. (3) In hybrid populations of Poplars, matrocliny is an uncommon phenomenon. (4) Photoperiodic requirements are hereditary. (5) The photoperiodic requirements of the parental species are segregated in the progeny, similarly to other genetically constant properties. (6) Seeds matured on dwarf trees are larger than seeds collected from twigs reared in water cultures, but no difference in the growth of the progeny is noticeable. (7) Crossings of the sections *Leuce* and *Aigeiros* commonly give dwarfed or stunted progeny. *From author's summary.*

1472. JABLOKOV, A. S. Piramidal'nye topoli. **[Fastigiate Poplars.]** Goslesbumizdat, Moscow & Leningrad. 1956. pp. 58. [Russ.] Price *Roubles* 2.

Discusses the importance of fastigiate Poplars for green-belt and street and roadside planting in the U.S.S.R.; their distribution in cultivation; trials in the breeding of quick-growing, frost-hardy varieties; and propagation.

1473. BOGDANOV, P. L. Novye gibridy topolej. **[New Poplar hybrids.]** *Lesn. Hoz.* 11 (3), 1958 (85–6). [Russ.]

Brief notes on *Populus suaveolens* × *P.* '*canadensis*' —the 'Leningrad Poplar', and a 'vegetative hybrid' taken from buds at the graft union of *P. suaveolens* and *P.* '*canadensis*'. Both are said to be fast-growing, and resistant to cold, and the vegetative hybrid is not susceptible to leaf rust.

1474. BOVET, J. Contribution à l'étude des races écologiques du frêne, *Fraxinus excelsior* L. **[A contribution to the study of ecological races in Ash.]** *Schweiz. Z. Forstw.* 109 (8/9), 1958 (536–46). 21 refs [F.g.]

In investigations on 3 specimens from dry calcareous sites ('lime Ash' type) and 1 from the banks of a stream ('water Ash' type) in the Swiss Jura, no cytological differences were found. The chromosome number was uniformly 23, as in Swedish and American determinations. Form and size of seeds from 20 trees varied considerably, but without characteristic differences between the two postulated edaphic types. Mitotic activity in flower buds and growth of stamens continued during the whole winter. Meiosis took place in mid-March. [Cf. *F.A.* 17 No. 3655.]

1475. RICHENS, R. H. **Studies on *Ulmus*. II. The village Elms of southern Cambridge.** *Forestry* 31 (2), 1958 (132–46). 20 refs.

In continuation of a preliminary study of the range of variation of East Anglian Elms [cf. *F.A.* 16 No. 2695] a taxonomic survey was made of the village Elms of S. Cambridgeshire, 132 samples being collected and classified into 7 biometrically defined groups—6 belonging to *Ulmus carpinifolia* and 1 to *U. procera*. The two species are linked by intermediate forms. At least two introductions of *U. carpinifolia* seem to have occurred, one of which appears to have been not later than Roman. *U. procera* was introduced not later than the Middle Ages. *From author's summary.*

166. Economic Botany (General)

See No. 2600.

168. Histology

See also Nos. 1581, 1750, 2251 *et seq.*

1476. DUHAMET, L. Sur la diversité des réactions de quelques tissus végétaux cultivés *in vitro* en présence de lait de coco, d'auxine et de mélanges de ces substances. **[The various reactions of some vegetable tissues grown *in vitro* in the presence of coconut milk, growth substances and mixtures of these substances.]** *C.R. Soc. Biol., Paris* 151 (12), 1957 (1958), (2043–5). [F.f.] O.R.S.

Cultures included those of *Crataegus monogyna* which grew in the presence of naphthalene-acetic acid, alone or with coconut milk, but not the latter alone, and *Salix caprea* which did not react to naphthalene-acetic acid, IAA, or coconut milk, alone or in combination. [Cf. *F.A.* 14 No. 1937.]

1477. BARNES, R. L. **Studies on physiology of isolated Pine roots and root callus cultures.** *Abstr. of thesis*, in *Dissert. Abstr.* 19 (3), 1958 (417–8). O.R.S.

Isolated roots of Pond, Sand, Longleaf, Slash and Loblolly Pines were grown in sterile culture. Intensive studies of nutrition and metabolism were made with roots of Pond Pine and to a less extent with those of Sand Pine; the media used varied, and the effect of adding e.g. glycine, vitamins, auxins and other growth-regulating compounds, respiratory inhibitors or amino-acids to the media was determined. Tissue cultures of Sand and Pond Pines from proliferation of callus tissue on isolated roots were also studied.

17. Systematic Botany

172.8. Eumycetes (True Fungi)

See Nos. 1989 *et seq.*, 2488 *et seq.*

174. Spermatophyta, Seed-Plants in General. Floras and Check-Lists

See also Nos. 1505, 1508, 1624.

1478. **Some Welsh trees.** National Museum of Wales, Cardiff. 1956. pp. 22. Price 2*s.*

A set of photographs, in most cases of leaves and flowers, of 14 common Welsh trees (giving their English, Latin and Welsh names) as an aid to their identification.

1479. REIS, F. DA SILVA, NUNES, F. S. F. PEREIRA, and SANTARENO, J. A. M. Essências

florestais da Guiné Portuguesa. Introdução ao estudo de algumas espécies. **[Forest species of Portuguese Guinea. Introduction to the study of some species.]** Jardim e Museu Agrícola do Ultramar, Ministerio do Ultramar, Lisbon. 1958. pp. 14. [Port.] [Cf. *F.A.* 20 No. 1507.]

1480. HUTCHINSON, J., and DALZIEL, J. M. [Revised by KEAY, R. W. J.] **Flora of West Tropical Africa. Vol. 1, Part 2.** Crown Agents for Oversea Governments and Administrations, London. 2nd ed. (rev.) 1958. pp. 296–828. Price 55*s*.

[Cf. *F.A.* 16 No. 135.] Vol. 1, Part 2 completes the Archichlamydeae (Tiliales to Umbelliflorae), and gives a list of additions and corrections to both parts and an index of scientific names, synonyms and misapplied names for the whole volume.

1481. HUBBARD, C. E., and MILNE-REDHEAD, E. [Editors]. **Flora of tropical East Africa. Caricaceae [*Cylicomorpha parviflora*].** Crown Agents for Oversea Governments and Administrations, London. 1958. pp. 4. Price 1*s*. 6*d*.

1482. HUBBARD, C. E., and MILNE-REDHEAD, E. [Editors]. **Flora of tropical East Africa. Cornaceae [*Afrocrania volkensii*].** Crown Agents for Oversea Governments and Administrations, London. 1958. pp. 3. Price 1*s*. 6*d*.

1483. STANDLEY, P. C., and STEYERMARK, J. A. **Flora of Guatemala. Part I. [Cycadaceae to Bromeliaceae.]** *Fieldiana* (*Bot.*) 24 (Part I), 1958. pp. ix + 478.

1484. WOOD, G. H. S., and AGAMA, J. **Check list of the forest flora of North Borneo.** *N. Borneo For. Rec.* No. 6, 1956. pp. 36. Price $1.50 or 3*s*. 9*d*. post free.

174.2/.7. Gymnosperms

See also Nos. 2254–5.

1485. FERRÉ, Y. DE. Revue de gymnospermie. Problèmes actuels relatifs aux conifères. **[Review of gymnospermy. Present problems relating to conifers.]** *Bull. Soc. bot. France* 105 (3/4), 1958 (155–205). 489 refs. [F.] O.B.D.

Deals with (1) structure and morphology, (2) growth and development, and (3) systematy and phylogeny.

1486. CARLISLE, A. **A guide to the named variants of Scots Pine (*Pinus silvestris* Linnaeus).** *Forestry* 31 (2), 1958 (203–24). 111 refs.

Deals with 144 scientific names used in the literature for the geographical and morphological variants of Scots Pine, giving descriptions and notes on the status of the variants.

1487. HUGUET, L., and MEJORADA, N. S. **Conifers of Mexico.** FAO, Rome. 1958. pp. 7 + 2 maps, 2 gphs., 1 dgm. 12 refs.

The aim of this paper is to draw the attention of tree-breeders to the enormous reservoir of genera, species, varieties, races and genetic characters represented by the Mexican conifers, including 38 *Pinus* spp., 8 *Abies* spp., 6 *Cupressus* spp., 12 *Juniperus* spp., and one sp. each of *Taxodium*, *Picea* and *Libocedrus*.

1488. ZOBEL, B., and CECH, F. **Pines from Nuevo Leon, Mexico.** *Madroño, S. Francisco* 14 (4), 1957 (133–44). 6 refs. E.B.

Describes a number of species, forms, and hybrids, collected in an area where several species commonly grow completely intermixed. The following are described: *Pinus ayacahuite* f. *brachyptera*, *P. arizonica* var. *stormiae*, *P. cembroides*, *P. hartwegii*, *P. pseudostrobus* with var. *estevezi* and f. *protuberans*, *P. montezumae* with var. *lindleyi*, *P. teocote*, *P. durangensis* f. *quinquefoliata*, *P. rudis*, and 4 unidentified species.

1489. MIROV, N. T. ***Pinus oaxacana*, a new species from Mexico.** *Madroño, S. Francisco* 14 (5), 1958 (145–50). 9 refs. E.B.

In Oaxaca and adjacent states of Mexico is found a Pine with very long, prominent projections of the apophyses of the cone scales. Though previously identified as a variety of *P. pseudostrobus*, it differs from that species, especially in the cones and in the chemical composition of the turpentine, and it is here published as a new species.

1490. GRAY, N. E. **A taxonomic revision of *Podocarpus*. XI. The South Pacific species of section *Podocarpus*, subsection B.** *J. Arnold Arbor.* 39 (4), 1958 (424–77). 11 refs.

Describes 29 species (4 new) and 10 varieties (3 new) in this subsection of section *Podocarpus* (previously *Eupodocarpus*) [cf. *F.A.* 10 No. 118]. Of the 39 taxa, about 10, 11 and 18 are respectively shrubs, small trees and large trees (⩾ 30 m.). Among the last are *P. idenburgensis* and *P. archboldii* spp. nov. from high-mountain rain forest, New Guinea. The key is based primarily on leaf morphology, and secondarily on terminal buds, pollen, cones, seed, twigs and ♀ cone peduncles.

176.1. Dicotyledons

See also Nos. 1475, 1567, 1585, 1610.

1491. BROWICZ, K. Klony Eurazji w Polsce. **[Eurasian species of *Acer* in Poland.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (289–333). 18 refs. [Pol.russ.e.]

[Cf. *F.A.* 17 No. 2512.] Lists, with leaf drawings and notes on location and dimensions, 21 species (4 hybrids), and more than 20 varieties and forms of Eurasian *Acer* found in parks and arboreta in Poland. It is considered that *A. mandshuricum*, *A. heldreichii* and *A. mono* are potentially valuable species for planting under Polish conditions.

1492. TUCKER, J. M., and MULLER, C. H. **The geographic history of *Quercus ajoensis*.** *Evolution* 10, 1956 (157–75). 10 refs. B.A.P.

Presents information on ecology, distribution, points of distinction from *Quercus turbinella*, hybridization between these two species, patterns of variation within populations, and fossil records. A number of facts point to *Q. ajoensis* being a subtropical species. Its closest relation, with which it forms the series *Relictae*, is *Q. hinckleyi*. The great

disparity in range between *Q. ajoensis* and its precursor in the early Pliocene of central Washington is a reflection of climatic changes that have occurred in the intervening period. It is suggested that *Q. ajoensis* has several times become relictual. The history of its distribution is reconstructed.

1493. TUCKER, J. M., and MULLER, C. H. **A reevaluation of the derivation of *Quercus margaretta* from *Quercus gambelii*.** *Evolution* 12 (1), 1958 (1–17). 38 refs. O.R.S.

A study of morphological relationships between the two species and their edaphic preferences, and of the biotic associates of *Q. gambelii*, suggests that *Q. gambelii*, contrary to opinions expressed earlier [see *F.A.* 14 No. 92], did not make any extensive eastward migration as recently as the Pleistocene and Late Pliocene and that *Q. margaretta*, whatever its ancestry, is not of such recent derivation, but that similarities between the species probably indicate a common ancestry, not more recent than Middle Tertiary or at latest, Late Miocene.

1494. MARTINEZ, M. Los encinos de México. VIII, IX. **[The Oaks of Mexico. VIII & IX.]** *An. Inst. Biol. Univ. Méx.* 28 (1/2), 1957 (39–84). [Span.] C.G.B. [Cf. *F.A.* 19 No. 1419.]

1495. **Poplars in forestry and land use.** *FAO For. & For. Prod. Stud.* No. 12, 1958. pp. x + 511. 221 refs. [E.] Price 17*s.* 6*d.* [The French version, 'Les peupliers dans la production du bois et l'utilization des terres', appeared in 1956.]

A comprehensive monograph compiled by a team of experts of the Executive Committee of the International Poplar Commission under the Chairmanship of *P. Guinier*, and the editorship of *R. G. Fontaine* and *R. J. Pourtet*, as follows: Classification, identification and distribution of Poplar types, including ecological and economic characteristics of the five sections of the genus *Populus* (*G. Houtzagers* and *J. Pourtet*). Poplar cultivation: Nursery practices and the intensive growing of Poplars (*A. Herbignat* and *G. Piccarolo*); Natural stands and their treatment, and The cultivation of Poplars in alluvial forests (*F. W. Bauer* and *E. Guillard*); Poplar growing in non-alluvial forests (*H. Leibundgut*) [cf. *F.A.* 19 No. 3929]. Animal pests and diseases: Animals, chiefly insects (*R. Regnier*); Diseases, including both organic and inorganic agencies (*T. R. Peace*). Genetics and breeding of Poplars (*H. Johnsson*). Characteristics of Poplar wood, its exploitation and utilization (*G. Giordano*), with numerous appendices on special aspects, including volume tables from different countries. Costs and yields of line planting in the Netherlands (*G. Houtzagers*). Poplar cultivation: On the banks of the Rio Genil [Spain] (*J.* and *E. Rojus*); In the Aube region [France] (*Chaton*); In the Po Valley (*V. Bellucci* and *E. Vaccarone*). Transmission of Poplar diseases from one country to another (*R. Rol, H. van Vloten* and *T. R. Peace*). Also a list of research stations, specimen test forms etc.

1496. SMETINAND, T. **The genus *Dipterocarpus*, Gaertn. f. in Thailand.** *Thai For. Bull.* (*Bot.*) No. 4, 1958. pp. 52 + 14 photos, 5 maps. [E.]

1497. BRENAN, J. P. M. **New and noteworthy Cassias from Tropical Africa.** *Kew Bull.* 1958 (2), (231–52).

1498. CASTIGLIONI, J. A. Lauráceas argentinas: II. Género *Ocotea*. **[Lauraceae of Argentina: II. The genus *Ocotea*.]** *Rev. Invest. for., B. Aires* 1 (4), 1957 (3–21 + 12 plates). [Span.span.]

Morphology and descriptions of 6 species, with a key, and notes on distribution.

1499. BUCHINGER, M., and FALCONE, R. Las Meliáceas argentinas. **[The Meliaceae of Argentina.]** *Rev. argent. Agron.* 25 (1/2), 1958 (57–63). [Span.] E.M.B.

Descriptions and keys to species of *Cedrela*, *Cabralea*, *Guarea* and *Trichilia*.

1500. GREEN, P. S. **A monographic revision of *Osmanthus* in Asia and America.** *Notes R. bot. Gdn. Edinb.* 22 (5), 1958 (439–542 + 20 photos).

1501. LAM, H. J. **Revision of the Burseraceae of the Malaysian area in a wider sense. V*b*. *Haplolobus*, a revised revision.** *Blumea* 9 (1), 1958 (237–72). Many refs. [E.] O.R.S.

[Cf. *F.A.* 16 No. 154.] Describes 17 species, including *H. lanceolatus*, *H. decipiens* and *H. pubescens* spp. nov. and *H. triphyllus* comb. nov., and reduces 9 species previously described to synonymy.

1502. VINK, W. **Revision of the Sapotaceae of the Malaysian area in a wider sense. XIII. *Chrysophyllum* L.** *Blumea* 9 (1), 1958 (21–74). [E.] O.R.S.

Consists of a key to the species, and descriptions of 25 species including *C. novoguineense*, *C. multipetalum*, *C. heteromerum*, *C. cochleare*, and *C. bakhuizenii* spp. nov., and the new combinations *C. litseiflorum* and *C. chartaceum*.

1503. ROYEN, P. VAN. **Revision of the Sapotaceae of the Malaysian area in a wider sense. XIV. *Diploknema* Pierre.** *Blumea* 9 (1), 1958 (75–88). [E.] O.R.S.

Consists of a key, and descriptions of the species *D. sebifera*, *D. ramiflora*, *D. oligomera*, *D. butyraceoides*, *D. butyracea* vars. *butyracea* and *andamensis* var. nov., and *D. siamensis*.

1504. BRUGGEN, A. C. VAN. **Revision of the Sapotaceae of the Malaysian area in a wider sense. XV. *Payena* A. de Candolle. XVI. *Aesandra* Pierre.** *Blumea* 9 (1), 1958 (89–142). [E.] O.R.S.

(XV). Discusses the distribution of the genus and the delimitation and interrelationships of the species, and includes a key to and description of 16 species including *P. gigas* and *P. lamii* sp. nov. (XVI). Describes *A. dongnaiensis*.

18. Plant Ecology

1505. HOSOKAWA, T. **On the synchorological and floristic trends of discontinuities in regard to the Japan-Liukiu-Formosa area.** *Repr.* from *Vegetatio* 8 (2), 1958 (65–92 + 4 plates). 86 refs. [E.e.]

Discusses the floristic and vegetational differences between (1) Formosa and the Philippines, (2)

Formosa and continental China, (3) Japan proper and continental China, together with Korea, Manchuria and the eastern part of Siberia, (4) Formosa and Japan proper; and outlines the flora of the Ryukyu Is. In addition, the vegetation of Formosa and Japan is briefly outlined, especially the altitudinal distribution of various forest communities. *From author's summary.*

181. Mode of Life, Autecology. Silvicultural Characters of Trees

See also Nos. 1495, 1613, 1624, 1669.

1506. WECK, J. Über Koniferen in den Tropen. **[Conifers in the tropics.]** *Forstwiss. Cbl.* 77 (7/8), 1958 (203–30). 33 refs. [G.]

In a 14-page table are listed 228 conifers native to the tropics, with their scientific names, natural distribution, and [where known] their forest formation-group (e.g. montane rain forest, dry savanna etc.), site requirements, growth (height and diam.), and wood properties. Also discusses in more detail some of these conifers already of accepted importance for forestry, viz. *Agathis* spp., *Pinus merkusii* and *Araucaria angustifolia.* [Cf. *F.A.* 20 No. 1666.]

1507. Essências florestais da Guiné Portuguesa. 6–10. **[Forest species of Portuguese Guinea. 6–10.]** Jardim e Museu Agrícola do Ultramar, Ministério do Ultramar, Lisbon. 1958. [Port.e.f.]

(6) *Erythrophleum guineense* (pp. 13 + 4 plates); (7) *Parkia biglobosa* (pp. 15 + 4 plates); (8) *Daniella oliveri* (pp. 15 + 5 plates); (9) *Prosopis africana* (pp. 13 + 4 plates); (10) *Detarium senegalense* (pp. 13 + 4 plates). [Cf. *F.A.* 17 No. 3693; 20 No. 1479.]

1508. HARLOW, W. H., and HARRAR, E. S. **Textbook of dendrology, covering the important trees of the United States and Canada.** McGraw-Hill Book Co., Inc., New York. 4th ed. 1958. pp. x + 561. 327 refs. Price $8.00 (£3. 8*s.*)

Includes revised range [distribution] maps and an enlarged glossary. [Cf. *F.A.* 12 No. 222.]

1509. VITÉ, J. P. Zur Kenntnis der westamerikanischen Lärche, *Larix occidentalis* Nuttal. **[*L. occidentalis*.]** *Forstwiss. Cbl.* 76 (9/10), 1957 (277–94). 26 refs. [G.]

Distribution, importance, distinguishing features, yield, silvicultural characters, pests and utilization.

1510. BOE, K. N. **Silvics of Western Larch [*Larix occidentalis*].** *Misc. Publ. Intermt. For. Range Exp. Sta.* No. 16, 1958. pp. 17. 47 refs.

1511. LANGDON, O. G. **Silvical characteristics Baldcypress (*Taxodium distichum* (L.) Rich. var. *distichum*).** *Sta. Pap. Stheast. For. Exp. Sta.* No. 24, 1958. pp. 7 + 1 map. 33 refs.

1512. CARMEAN, W. H. **Silvical characteristics of Yellow Buckeye (*Aesculus octandra*).** *Misc. Release Cent. St. For. Exp. Sta.* No. 29, 1958. pp. 16. 43 refs.

1513. CLARK, F. B. **Silvical characteristics of Butternut [*Juglans cinerea*].** *Misc. Release Cent. St. For. Exp. Sta.* No. 28, 1958. pp. 9. 20 refs.

1514. READ, R. A. **Silvical characteristics of Plains Cottonwood [*Populus sargentii*].** *Sta. Pap. Rocky Mt. For. Range Exp. Sta.* No. 33, 1958. pp. 18. 25 refs.

1515. ROE, A. L. **Silvics of Black Cottonwood [*Populus trichocarpa*].** *Misc. Publ. Intermt. For. Range Exp. Sta.* No. 17, 1958. pp. 18. 23 refs.

1516. KOBENDZA, R. Miłorząb dwudzielny (*Ginkgo biloba* L.) Syn. *Salisburia adiantifolia* Sm. **[*G. biloba.*]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (39–65). 79 refs. [Pol.russ.e.]

Discusses the origin of the species, the history of its introduction to Europe, morphological and ecological characteristics, climatic and edaphic preferences, propagation, aesthetic value, and resistance to pests, dust and smoke.

1517. MYCZKOWSKI, S. Z zagadnień ekologii świerka pospolitego (*Picea excelsa* (Lam.) Lk). **[The ecology of *P. abies*].** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (433–60). 57 refs. [Pol.russ.e.]

Discusses ecological principles and literature on the ecology of Spruce in the Polish Carpathians. The most extensive natural pure Spruce forests are at the highest levels and have a protective function; natural Spruce becomes less and less frequent on the lower land. The large pure Spruce plantations on low ground give poor yields and are very prone to insect damage. In view of this, attention should be paid to ecological principles, and Spruce should be planted only on areas corresponding closely to its natural habitat.

1518. ZALESKA, J. Obserwacje nad biologią i rozmnażaniem klonu jesionolistnego (*Acer negundo* L.). **[Observations on the biology and propagation of *A. negundo.*]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (257–72). 26 refs. [Pol. russ.e.]

Discusses leaf polymorphism, the adaptability of the species to different sites, the rather poor root system, the ease of natural regeneration, and methods of propagation.

1519. VYSOCKIJ, K. K. Železnaja bereza. **[*Betula schmidtii.*]** *Priroda, Moskva* 47 (6), 1958 (100–1). [Russ.] A.P.B.

Notes on morphology, phenology and site requirements. As the wood is the heaviest, strongest and hardest of the Soviet Far East, measures should be taken to preserve this species in its natural habitat in the coastal regions, and to introduce it into other regions.

1520. RAZOUS, P., and DUBRET, R. Le hêtre de France, son importance, son exploitation, et ses emplois. **[The Beech in France—its importance, its exploitation, and its uses.]** *Bois et Scieries* 64 (52; 55), 1958 (1097 . . . 1101; 1167 . . . 1175). [F.]

1521. BEAUCORPS, G. DE, MARION, J., and SAUVAGE, C. Essai monographique sur une parcelle d'expériences dans la forêt de chêne-liège de la Mamora (Maroc). **[Monograph on an experimental plot in the Cork Oak forest of Mamora, Morocco.]**

Ann. Rech. for. Maroc 4 (2), 1956 (1958). pp. 273 + 9 photos, 3 maps. 58 refs. [F.f.e.span.]

A complete study of the soils, vegetation, and natural regeneration of *Quercus suber* in a 4-ha. experimental plot observed during 10 years. It includes the following sections: General factors of the environment (*J. Marion*); Intrinsic characters of the soil (*G. de Beaucorps*); The vegetative cover (*C. Sauvage*); Relation between soil and vegetative cover (*G. de Beaucorps* and *C. Sauvage*); Relations between the environment and the forest stand (*J. Marion*); with annexes, (1) list of phanerogamic species and vascular cryptogams found on the plot; (2) influence of forest cover and maquis on the amount of water reaching the soil in the forest of Mamora; (3) influence of undergrowth of *Cytisus linifolius* on the evolution of Cork Oak stands. The individual studies have been published at intervals during the progress of the research project, and noticed separately in *F.A.* [cf. *F.A.* 17 Nos. 3574, 3663; 18 Nos. 304–5, 377, 424; 19 No. 2872].

1522. BENSI, G. **[The cultivation, yield and utilization of *Castanea sativa* in Italy.]** *Cellulosa e Carta* 9 (6; 7), 1958 (3–19; 9–25). [It.f.e.g.]

A general account of the species and its principal diseases, distribution in Italy with statistical data for 1937–57, wood properties, tannins (chemistry, extraction etc.), uses of tannin-extracted wood, yields of different assortments and of tannins, and future policy.

1523. MAGIC, D. Hikória a jej pestovanie v lese. **[Hickory as a forest tree.]** *Lesn. Čas.* 4 (4/5), 1958 (258–313). 47 refs. [Slovak.]

Describes the genus, giving fuller data on the individual species: *Carya ovata, C. laciniosa, C. tomentosa, C. cordiformis*, and *C. glabra*. Outlines distribution in the U.S.A., planting, propagation, tending of stands, increment, and ecology with reference to the prospects of *Carya* in Slovakia. Also discusses results of trial plantings of the species in other parts of Europe, notably Germany.

1524. BURGERS, T. F. ***Eucalyptus botryoides* Sm.** *Montes, Madrid* 14 (82), 1958 (295–8). 12 refs. [Span.]

Silvicultural characters, plantations outside Australia, figures for average growth in Italy, S. Africa and Spain, properties of the wood, and other general information.

1525. MANGIERI, H. R. Estudio ecológico orientativo de los *Eucalyptus globulus, viminalis, camaldulensis* y *sideroxylon* en la provincia de Buenos Aires. **[Ecological and exploratory study of *E. globulus, E. viminalis, E. rostrata* and *E. sideroxylon* in Buenos Aires province.]** [*Pap.*] *I^as Jorn. argent. Eucalipto Asoc. for. argent.* No. 231–200, 1957. pp. 11 + 5 maps, 1 gph. [Span.]

Describes the silvicultural characters of these species and the optimum conditions under which they grow in Australia, and presents a rating of various zones in Buenos Aires according to their suitability for growing them.

1526. KANNAN, K. **The *Eucalyptus* that came to the plains.** *Indian Fmg.* 8 (6), 1958 (22–3). O.R.E.

An account of *E. citriodora*, covering description, propagation, tending, and the distillation of its oil. Examination of costs shows it to be an economically worthwhile crop, and its growing on a large scale should be encouraged.

181.1. Distribution, Natural Range

See also No. 1612.

1527. DALE, E. E., JR. **Occurrence of tree species as related to underlying rocks in the Arbuckle Mountains, Oklahoma.** *Abstr.* in *Bull. ecol. Soc. Amer.* 39 (3), 1958 (86). A.P.B.

1528. SCHMIDT, R. L. **Climate and the altitudinal distribution of conifers.** *For. Res. Rev. B.C. For. Serv. 1957/58*, 1958 (18–9).

A series of 8 climatic stations were established in the Elk Valley on Vancouver Island, on two aspects between 1000 and 4600 ft. Within the altitudinal range of *Pseudotsuga taxifolia, Tsuga heterophylla* and *Thuja plicata*, the length of the frost-free period decreased at the rate of 2·8 days per 500 ft. rise in altitude, whereas 500 ft. above the limits of these species, the frost-free period decreased by 36 days. This abrupt decrease in length of frost-free period probably indicates the presence of a climatic boundary controlling the upper limits of these species. Upland species (*Abies lasiocarpa, A. amabilis, Tsuga mertensiana* and *Chamaecyparis nootkatensis*) are unaffected by this boundary.

1529. INGELSBY, B. **Distribution of the Tulip Tree (*Liriodendron tulipifera* L.) in south-western New York.** *Amer. Midl. Nat.* 59 (2), 1958 (397–417). 21 refs. B.A.P.

A study of the vegetation, and the distribution and silvicultural characters of *L. tulipifera*. It appears to thrive in the same habitat that formerly favoured *Castanea dentata*, is replacing this species in the forest composition, and, with suitable management, could be encouraged to spread in this region.

1530. FURRER, E.; CLOSUIT, R. **[The distribution of Sweet Chestnut in Switzerland north of the Alps. I. Sweet Chestnut in Central Switzerland. II. Sweet Chestnut in the Swiss Rhone Valley.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 34 (3), 1958 (89–220 + 7 photos, 3 maps). 91 refs. [G.f.it.; F.g.it.]

Presents an inventory of individual trees and stands in Cantons Lucerne, Nidwalden, Schwyz, Uri, Zug, Vaud and Valais (made to facilitate control of *Endothia parasitica* should it cross the Alps) together with information on topography, climate, soils, vegetation etc., and on the history and the (declining) economic significance of the species in these areas.

1531. POSPÍŠIL, J. Rozšíření osiky v ČSR. **[The distribution of *Populus tremula* in Czechoslovakia.]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (9), 1958 (761–80). 20 refs. [Cz.russ.g.]

Details the distribution: (1) at various altitudes, indicating whether it occurs singly, in groups, or in pure stands; (2) for the individual regions of Czechoslovakia; (3) as affected by human activity from 1841 to 1951; (4) by age classes; (5) according

to the composition of the stands in which it occurs (broadleaved, coniferous, or mixed).

1532. NORIN, B. N. K harakteristike čosenievyh soobščestv (*Chosenia macrolepis* Ass.) na krajnem severo-zapade ih areala. [**The characteristics of *C. macrolepis* communities at the N.W. limit of their range.**] *Bot. Ž.* 43 (6), 1958 (847–50). 8 refs. [Russ.]

A short description of the species, and a list of the plants growing in association with it, as found near the river Kuramis, at 70° 45′ N., 127° 45′ E.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 1347, 1438, 1458, 1462, 1471, 1528, 1574, 1580, 1664 *et seq.*, 2048.

1533. BOURDEAU, P. F., and LAVERICK, M. L. **Tolerance and photosynthetic adaptability to light intensity in White Pine, Red Pine, Hemlock and *Ailanthus* seedlings.** *For. Sci.* 4 (3), 1958 (196–207). 27 refs.

[Cf. *F.A.* 17 No. 212.] Seedlings of Red and Eastern White Pine, Eastern Hemlock and *Ailanthus altissima* were assigned shortly after emergence to full illumination and to light, moderate and deep shade regimes. When 4–6 months old, photosynthesis and respiration rates were measured under varying light intensities, after which the fresh weights of needles, shoots and roots of the conifers and the fresh weights and areas of the *Ailanthus* leaves, H_2O, N and chlorophyll *a* and *b* content, and anatomical differences in the leaves, were determined. On the basis of unit needle-weight, the shade needles of the Pines had higher photosynthetic rates than the sun needles, those of the Red Pine had a lower compensation point and were relatively more efficient in weak light than the sun needles. Photosynthesis curves of the Hemlock were almost coincident for all regimes and this species was more efficient in weak light than the Pines. Chlorophyll and N content of the leaves generally increased with shading. Photosynthetic yields per unit amount of chlorophyll were not significantly affected by shading in the Pines. In the Hemlock they were lower in shade-grown needles; chlorophyll might be limiting in the Pines but not in the Hemlock. *Ailanthus* leaves were negatively adapted to light intensity, the shade leaves being less efficient than the sun, a fact possibly related to the intolerance of the species.

1534. TASHIMA, Y. [**Effect of day length on the seedlings of Pines and the other conifers: relation between day-length and juvenile form.**] *Bulletin, Faculty of Agriculture, Kagoshima University* No. 4, 1955 (127–30). 14 refs. [Jap.e.*e.*]

In the Pines, the development and number of adult leaves and the elongation of the leading shoot were promoted by an increase in day-length, but the number of primordial leaves was not influenced. *From author's summary.*

1535. TASHIMA, Y. [**Effect of light break on the development of [adult] needle leaves of *Pinus thunbergii* seedlings.**] *Bulletin, Faculty of Agriculture, Kagoshima University* No. 4, 1955 (131–3). 5 refs. [Jap.jap.e.*e.*]

The growth rate was greatest with continuous light, next with an interruption in the dark period (7 hr. sunlight, 8 hr. darkness, 1 hr. artificial light, 8 hr. darkness), and least with a short day (7 hr. sunlight + 1 hr. artificial light).

1536. TASHIMA, Y., *et al.* [**Effect of preliminary short-day treatment on the development of needle leaves of Pine seedlings.**] *Bulletin, Faculty of Agriculture, Kagoshima University* No. 4, 1955 (134–6). 3 refs. [Jap.jap.e.*e.*]

The emergence of adult leaves and the elongation of the main shoot were promoted in *Pinus densiflora* and *P. thunbergii* by 10–30 days of short day-length in the early stage of growth. *From authors' summary.*

1537. TASHIMA, Y., SAKO, S., and OHARA, Y. [**Effect of day-length on the seedlings of *Pinus luchuensis*.**] *Bulletin, Faculty of Agriculture, Kagoshima University* No. 4, 1955 (137–9). [Jap.e.*e.*]

Plants under a short-day regime had better adult leaf development, but those under a long-day regime showed better main shoot growth. *From authors' summary.*

1538. DOWNS, R. J., and PIRINGER, A. A., JR. **Effects of photoperiod and kind of supplemental light on vegetative growth of Pines.** *For. Sci.* 4 (3), 1958 (185–95). 15 refs.

[Cf. *F.A.* 19 No. 170.] The number and length of acicular leaves and needles, the growth in length of juvenile stem, stem and branches, and the fresh and dry weights of the stem in *Pinus ponderosa* (3 provenances), *P. taeda* (2), *P. ponderosa* var. *arizonica* and *P. virginiana* (1 each) were measured in seedlings and transplants grown under photoperiods of 8, 12, 14, and 16 hr., some also in continuous light or natural days interrupted by dark periods. The generally similar response of these Pines was to produce the greatest juvenile stem growth and most acicular leaves with the 14- and 16-hr. periods, and greater total growth, fresh and dry stem weight and needle length with continuous light than with the 16-hr. period, indicating that a period of darkness is more important for juvenile than for adult growth. Responses differed in detail between the species, and also between provenances, the factor representing differences in response between the latter decreasing with increased temperatures, suggesting 'temperature-photoperiodic ecotypes'. In the 16-hr. tests, the use of incandescent supplemental light gave total growth ca. 100% greater than fluorescent supplemental light.

1539. YEATMAN, C. W., and VOIGT, G. K. **A photoreaction in Paper Birch seedlings.** *For. Sci.* 4 (3), 1958 (208–11). 9 refs.

Attributes a 3-fold increase in dry matter by seedlings of *Betula papyrifera* grown in flats to the accidental illumination of some of them by a street lamp, which added about 13 hours of 2 ergs/sq. cm./sec. to the light of a short day. This intensity is somewhat lower than the threshold values previously reported for photoperiod responses in woody plants.

1540. HULL, H. M. **The effect of day and night temperature on growth, foliar wax content and cuticle**

development of Velvet Mesquite. *Weeds* 6 (1), 1958 (133–42). 11 refs. From *abstr.* in *Weed Abstr.* 7 (7), 1958 (1101). O.R.E.

Velvet Mesquite (*Prosopis juliflora* var. *velutina*) was grown for 97 days at 6 different day (26–30° C.) and night (17–26°) temperatures; plants kept at 30° day and 26° night temperatures showed the most rapid growth as measured by fresh or dry weight, height and leaf count. The wax content of leaflets was greatest at the highest day and night temperatures; their non-wax fatty content, at the lowest temperatures. Leaflets from field plants showed a well developed cuticle, after leaf maturation, while leaflets of greenhouse plants from the different temperature treatments when incubated with pectinase showed a lack of cuticle; stems showed a distinct cuticle.

1541. THOMAS, D. **Tree-crown deformation as an index of exposure intensity.** *Forestry* 31 (2), 1958 (121–31). 10 refs.

Briefly reviews the literature (mainly from Japan, Germany and the U.S.A.) and then, as a result of a pilot investigation in N. Cardiganshire, proposes 5 tree-deformation classes suitable for the differentiation of various degrees of exposure in agricultural areas in the British Isles. In illustration, the detailed survey carried out in the Melindwr valley, using *Crataegus* spp. as the indicator, is discussed. It is concluded that, though absolute wind-speed values cannot be assigned to deformation types, important exposure differences not associated with catastrophic events can be distinguished over small areas, with sufficient accuracy to give a basis for the classification of shelter needs. *From author's summary.*

1542. VASIL'EV, A. V. Iz opyta akklimatizacii subtropičeskih rastenij v Suhumskom botaničeskom sadu. [**Some results of acclimatization trials with subtropical plants in Sukhumi Botanical Garden [Georgia, U.S.S.R.].**] *Bot. Ž.* 43 (9), 1958 (1333–7). 9 refs. [Russ.]

Lists exotic species, including many trees, in 5 groups: (1) plants killed by frost in a hard Sukhumi winter; (2) killed to the roots in a hard winter but sending up shoots in the spring; (3) damaged frequently by frost; (4) suffering frost damage to young leaves and shoots in hard winters only; (5) damaged by frost when young, but resistant when older. Also indicates, for each species, its country of origin, whether flowering and fruiting occur, and annual height growth.

1543. SENETA, W. Ambrowiec amerykański—*Liquidambar styraciflua* L. w Warszawie i w Skierniewicach. [***L. styraciflua* in Warsaw and Skierniewice.**] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (215–23). 6 refs. [Pol.russ. g.]

Describes the two specimens. The Warsaw one is 6 m. high and was not damaged by frost in the 1955–56 winter, but the majority of the specimens in Poland suffer considerably, and usually grow like shrubs.

1544. HADFIELD, M. **The Tulip tree—and some ghosts.** *Quart. J. For.* 52 (4), 1958 (294–9 + 1 plate). 16 refs.

Gives an account of the introduction of *Liriodendron tulipifera* from America to Great Britain (and of the historical figures concerned with its introduction), some morphological data, and brief notes on raising.

181.3. Water, Soil and Root Relations

See also No. 1776.

1545. BRENDEMUEHL, R. H. **Growth, yield and site requirements of Eastern Cottonwood [*Populus deltoides*].** *Abstr. of thesis*, in *Iowa St. Coll. J. Sci.* 32 (2), 1958 (140–1). O.R.E.

Discusses stand and site characteristics including site index, soil texture, moisture, aeration and nutrient content, pH etc., on 66 plots in pure even-aged stands in the flood-plains of W. and S.W. Iowa. Available moisture and N-production capacity of the soil were the most important factors for growth.

1546. WOODWELL, G. M. **Factors controlling growth of Pond Pine seedlings in organic soils of the Carolinas.** *Ecol. Monogr.* 28 (3), 1958 (219–36). 41 refs.

The study included investigation of profile, and analyses of soil for chemical and physical properties, on 6 sites, as well as pot cultures of seedlings. It was found that flooding, soil aeration, and profile development were relatively unimportant to the growth of *Pinus serotina* seedlings, the principal factors affecting this in these pocosin soils being soil N and P. There appear to be physiological differences in *P. serotina* from N. and S. of the region. [Cf. *F.A.* 20 No. 1798.]

181.31. Water Relations

See also Nos. 1431–2, 1549, 1696, 2178.

1547. WHANG, H. A., *et al.* **Effect of humidity on growth of selected ornamental plants.** *Quart. Bull. Mich. agric. Exp. Sta.* 41 (1), 1958 (139–43).

Four species of non-woody broadleaved plants, and 5 conifers—*Juniperus chinensis*, *Pinus nigra*, *Taxus cuspidata*, and *Taxus media* var. *hicksii*—were grown in pots for 5 months at a low (34·4%) or high (91·8%) relative humidity, and a mean daily temperature of 74·6–77·2° F. Data are given on fresh and dry weight and leaf thickness from both treatments. Plants grown in low humidity needed ca. 4 times as much water. The conifers showed no relationship between plant weight and humidity, but needles grown in a highly humid atmosphere were thicker.

1548. ZAHNER, R. **Hardwood understorey depletes soil water in Pine stands.** *For. Sci.* 4 (3), 1958 (178–84). 10 refs.

[Cf. *F.A.* 17 No. 2414.] In upland Pine forests of the mid-south, well stocked plots of 50-year *P. taeda*/*P. echinata* with an understorey of up to 20,000 stems/acre, and up to 25 ft. high, had the understorey (*a*) completely killed chemically, (*b*) killed back to the ground by two controlled burns in successive years, (*c*) left untreated. Spring rains

kept the silt-loam near field capacity until mid or late May but severe or moderate July droughts followed in the 4 summers of the experiment. By July, moisture in the critical top 4 ft. of soil was 50% greater in (*a*) than in (*c*) plots; that of (*b*) was slightly higher than in (*c*) but considerably lower than in (*a*).

181.32/.34. Soil and Nutrient Relations

See also Nos. 1362–3, 1366–71, 1433–5, 1458, 1474, 1527, 1545–6, 1616, 1695, 1795, 1932, 2162–4.

1549. RICHARD, F., CHAUSSON, J.-S., and SURBER, E. Der Einfluss der Wasserbindung und der Bodenstruktur auf das Wachstum von Fichtenkeimlingen. [**The influence of soil moisture tension and soil structure on the growth of young Spruce seedlings.**] *Mitt. Schweiz. Anst. forstl. Versuchsw.* 34 (1), 1958 (1–34 + 9 photos). 14 refs. [G.g.f.it.e.]

To test the effect of soil structure and moisture tension, a neutral, poorly aerated loam (Zugerberg II) was modified by adding 0·2% or 1% Krilium and each structure held under 0·02, 0·08 and 0·16 atm. tension, corresponding to moisture contents of 77, 69 and 65% on the untreated, 39, 36 and 32 on the 0·2% Krilium, and 34, 32 and 30% on the 1% Krilium soil. When sown with Spruce (104 seeds per treatment) germination was normal (92%) except on the wettest untreated plot, where it was 51%, and the seedling mortality 58%. Increasing the % of air-filled pores, either by increasing the water tension or by Krilium treatment, reduced mortality to 8–20%. Shoot growth differed little, but root growth considerably, between treatments. There were hardly any lateral roots on the untreated, very wet soil, but their total length increased with increased tension though it did not reach the total length found on the Krilium-treated soils, where, however, the effect of increased water tension was small.

1550. HUIKARI, O. Kasvualustan lämpötilan merkitys puiden kasvutekijana. [**The significance of the temperature of the nutrient layer as a growth factor for trees.**] *Metsät. Aikak.* 1958 (10), (333–6). 10 refs. [Fi.e.]

On two sample plots, the snow was covered with straw to keep the nutrient layer snow-covered and frozen longer than usual, and d.b.h. and height growth of 44 sample trees (28 Pines, 8 Spruce, 8 Birch), and soil temperatures at depths of 5, 20 and 40 cm. were measured [from 8 May to 20 Aug.]. Diameter and height growth were both greater on the straw-covered plots, and it is concluded that growth is not directly correlated with the temperature of the nutrient layer during growth. *From author's summary.*

1551. ĆOROVIĆ, M., and STJEPANOVIĆ, L. Rastenje korena i korenskih dlaka kod biljaka *Pinus nigra* L. i *Robinia pseudoacacia* L. na različitim temperaturama podloge. [**The growth of roots and root-hairs of *P. nigra* and *R. pseudoacacia* at different substratum temperatures.**] *Šumarstvo* 11 (5/6), 1958 (305–14). 13 refs. [Serb.serb.e.f.]

Two-year seedlings of *P. nigra* and *R. pseudoacacia* were grown both out of doors and in an unheated room in winter 1956–57. At soil temperatures of 0–1·5° C. *P. nigra* roots continued to grow, but slowly, and no root-hairs were formed, while at soil temperatures of < 9·5° root extension was much greater and hairs were continually formed. At low soil temperatures *R. pseudoacacia* roots and root-hairs stopped growing but remained alive; in the higher temperature range there was considerable root growth, and lateral roots and abundant root-hairs developed. Leaf buds appeared in December and leaves reached their maximum size in February.

1552. JACKSON, W. N. **Some soil characteristics of several grassland-timber transitions in Wyoming.** *Abstr.* in *Journal of the Colorado-Wyoming Academy of Science, Denver* 4 (9), 1957 (37–8).

Soil characteristics were studied on sites in the Big Horn mountains, average annual precipitation ca. 25 in., with Lodgepole Pine on the drier and Engelmann Spruce on the moister sites, and in the Laramie plains, precipitation ca. 10 in., with Ponderosa Pine on exposed outcrops of white sandstone and gray carbonaceous shales. The pH of the surface soil, but not necessarily of the subsoil, of the timber stands was always slightly or strongly more acid than the adjacent grassland soils. No podzolization was found. The acidity of the soils of the Laramie Basin was the result of the parent material; no other vegetation grows well on this acid material, and the Pines, with an extensive root system, can survive in a semi-arid region. In the Big Horns, however, the acid condition results from the coniferous vegetation. An accumulation of soluble phosphates was found under nearly every stand, while the adjacent grasslands were low in available phosphates. No correlation could be established between the moisture equivalent of the grassland soils and the timber soils.

1553. GOOR, C. P. VAN. Het grondonderzoek voor de bosbouw. [**Soil research for forestry.**] *Ned. Bosb. Tijdschr.* 30 (9), 1958 (274–6). [Du.]

Criticizes the material cited by Blokhuis [see *F.A.* 20 No. 247] on the grounds of its inadequacy and lack of homogeneity, and cites other figures showing a positive effect by P fertilizers on shoot growth of Larch. Concludes that soil analysis provides a useful indication of the need to apply fertilizers.

1554. BÖSZÖRMÉNYI, Z. **Leaf analysis investigations with Scotch Pine seedlings: the problem of the constancy of critical nutrient concentrations.** *Repr.* from *Acta Botanica Academiae Scientiarum Hungaricae, Budapest* 4 (1/2), 1958 (19–44). 70 refs. [E.e.]

Describes results already reported [see *F.A.* 18 No. 192] and those of similar experiments made in the following year. In 1955, 25 different nutrient solutions were used, combining 5 levels each of N and P. The previous year's results were generally confirmed. P deficiency in seedlings was characterized by stunting, short needles, or a reddish-purple colour, and occurred at P contents of < 0·10 to 0·12% in the leaves compared with < 0·6–0·7% for N. The % P content increased with increasing amount of N added, and vice versa. No very clear relation was found between K and Ca contents and addition of P, but Mg remained constant or tended to increase slightly with increasing

amounts of P fertilizer. The critical N % in the leaves increased with increasing addition of P from 0·96 to 2·94, and the critical P % with increasing addition of N from 0·08 to 0·28. The optimum N/P ratio varied with different N and P levels, between 5 and 16.

181.35. Special Modes of Nutrition. Symbiotic Relationships. Parasitism

See also Nos. 1571, 1721, 1734–5, 2004.

1555. SALJAEV, R. K. Anatomičeskoe stroenie kornevyh okončanij vzrosloj sosny i hod formirovanija na nih mikoriz. **[The anatomical structure of the root-tips of adult *Pinus sylvestris* and the development of mycorrhizae on them.]** *Bot. Ž.* 43 (6), 1958 (869–76). 6 refs. [Russ.]

Describes, with illustrations, the anatomy of the root-tips, and the development of mycorrhizae on short (absorbing) and long roots, distinguishing between (*a*) quick- and (*b*) slow-growing long roots, using material collected from Pines of age classes I and V growing in a pure stand. There were no significant differences between trees of the two age classes as regards root anatomy or mycorrhiza formation. Both (*a*) and (*b*) freely formed mycorrhizae: on (*a*), the root grew faster than the hyphae, so that the apex of the root-cap protruded beyond the fungus mantle; on (*b*) the mantle completely enclosed the root apex. The strongest-growing, thickest rootlets (1–2 mm.) were completely free of fungal infection. The short roots were always covered, even during growth, with a fungus mantle. The development of mycorrhizae throughout the growing season is described for all three types of rootlet.

1556. ZIEGLER, H. Die Bedeutung der Knöllchenbakterien für den Stickstoffhaushalt der Robinie (*Robinia pseudoacacia* L). **[The importance of root nodules in the N economy of *R. pseudoacacia*.]** *Arch. Forstw.* 7 (4/5), 1958 (352–69). 52 refs. [G.g.russ.e.]

In semi-sterile (sand) cultures, the N concentration in 12-weeks-old seedlings was found to be dependent on nodule formation. It decreased from the 11th to the 17th week far less in nodule-bearing plants than in nodule-free controls. After 11–14 weeks' symbiosis, N uptake depended on the number of nodules and amounted after 14 weeks to 10 mg. per seedling, if a little 'starter' of N was added to the culture solution. Without this stimulation the N uptake after 11 weeks was only 3 mg. Up to 50 mg./litre of N in the solution did not inhibit nodule formation. The N content of Robinia seedlings potted in soil with Birch or Pine plants was higher than that of the non-legumes. Birch in such a mixture showed (but non-significantly) more N than Birch grown alone. Robinia growing in the closest proximity to 3-year Birch had no toxic influence on the latter. A higher content of N was found in free-growing Robinia than in Birch, Beech, Hornbeam or Hazel in comparable sites. In semi-sterile (sand) cultures, inoculation with suspensions of *Rhizobium* proved very successful, though sieved soil from under healthy older Robinia showing good nodule formation, or cold-water extractives of such soil, or cultures from freshly dug turgid nodules also succeed.

181.36. Root Relations and Root Development etc.

See also Nos. 1380, 1432–3, 1445, 1456, 1794, 2123–4.

1557. HENGST, E. Wurzelstockuntersuchungen an der Douglasie. **[The root system of Douglas Fir.]** *Arch. Forstw.* 7 (4/5), 1958 (338–51). 7 refs. [G.g.russ.e.]

Reports studies based on 21 trees (including green and blue races) from the Dresdner Heide, and single stems from elsewhere in Saxony and Thuringia. Tables of the distribution in volume, length, number etc. of roots of various diameter, show the influence of race (apparently nil), tree class (decisive), age (development outlined) and soil (important). A comparison with roots of Spruce and Scots Pine includes spread and depth of root system and the volume of rooting space. The Douglas root system has two more or less marked main root-insertion zones, the upper of strong oval side roots reaching close underground to beyond the crown projection, the lower and inner of outward sloping roots which soon divide into secondaries and which enclose a half-cone of soil. Soil exploration by secondaries is almost as extensive as in hardwoods, and greater than in Spruce and Pine. The system falls between the heart- and horizontal-rooted classes [cf. *F.A.* 18 No. 1380]. The tap-root is easily lost. Root-grafting occurs.

1558. TUMIŁOWICZ, J. O zarastaniu ściętych pni modrzewia. **[The healing over of Larch stumps.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (151–60). 6 refs. [Pol.russ.e.]

A continuation of Kobendza's work [cf. *F.A.* 17 No. 2561]. Describes the structure of the calluses on *Larix decidua* var. *polonica* stumps in the Mała Wieś forest in transverse, radial and tangential sections, and the differences between them and normal wood. Root grafting was noted in both stumps examined.

1559. SIMUNOVIĆ, M. Fiziološko sraščivanje korijenja alepskog bora, primorskog bora i pinjola. **[Root grafting in *Pinus halepensis*, *P. pinaster* and *P. pinea*.]** *Šum. List* 82 (7/9), 1958 (268–77). 3 refs. [Croat.f.]

Observations in nature on these Pines, the chief species used in afforesting the Karst region, showed that root-grafting was commonest in *P. pinaster*. There were more living than dead stumps up to a distance of 2 m. from the nearest living tree with *P. halepensis* and *P. pinea*, and up to 3 m. with *P. pinaster*. To improve growth conditions for plantations on Karst, the author recommends raising seedlings in the nursery in soil infected with mycorrhizae and planting the seedlings in clumps of 3–5 per planting hole. This should hasten the development of favourable mycofloral conditions, while root-grafting should help to improve resistance to drought, particularly for *P. halepensis*. Trial tappings of living stumps for resin yielded per face, from 4 *P. halepensis* stumps, 14–42% of the amount

obtained from the nearest stems, while from 2 stumps of *P. pinaster* yields were 0·9 and 0·3 kg./face.

181.4. Reaction to Biotic Influences (Competition etc.) and Fire

See also Nos. 1434, 1592–4, 1769, 1794, 1913–4, 1950–1, 1974.

1560. Ivašin, D. S. Ob otrastanii i vtoričnom cvetenii rastenij na požariščah južnogo Urala. [**Second growth and flowering of plants on burned areas in the S. Urals.**] *Bot. Ž.* 43 (10), 1958 (1469–72). [Russ.]

Lists plants which grew, and some which even flowered again, after being burned by July fires in the hot droughty summer of 1951. Among trees, *Juniperus communis* made no re-growth, but *Betula verrucosa* sent up coppice shoots; *Larix sibirica* with burned needles but live shoots grew new needles, but *Pinus sylvestris* did not.

181.5. Reproductive Behaviour

See also Nos. 1449, 1458, 1460, 1533–9, 1546, 1651 *et seq.*, 1703 *et seq.*

1561. Li, C.-L. **A monoecious tree of *Ginkgo biloba*.** *Acta bot. sinica* 6, 1957 (189–93). [Chin.] From *abstr.* in *Plant Breed. Abstr.* 28 (4), 1958 (No. 4756).

A tree growing near Peking has ♂ branches in the lower part and ♀ branches above. Though the possibility of grafting cannot be excluded, the author is inclined to believe that the tree is genuinely monoecious.

1562. Grisjuk, N. M. Poligamija i odnodomnost' u *Gleditschia triacanthos* L. [**Polygamy and monoeciousness in *Gleditsia triacanthos*.**] *Bot. Ž.* 43 (10), 1958 (1488–90). 6 refs. [Russ.]

From examination of literature and specimens, concludes that *G. triacanthos* is usually dioecious, but that monoecious specimens are also found, with ♂, ♀ and ☿ flowers on the same tree.

1563. Gorčakovskij, P. L. Novoe v metodike issledovanija dinamiki semenošenija hvojnyh. [**More on the method of investigating the dynamics of seed-bearing in conifers.**] *Bot. Ž.* 43 (10), 1958 (1445–59). 17 refs. [Russ.]

The method, developed by the author, involves examination of the twigs and branches for morphological signs indicating the former position of fallen cones. The formation and position of cones on growing shoots of *Abies*, *Picea* and *Pinus* is described from this aspect. It has been found possible to trace cone, and hence seed, production for the preceding 9–10 years on Fir, and at least 4–5 years on Spruce; on Pine the periods vary greatly with species and latitude. The prediction of cone production for these genera is also discussed, on the basis of morphological indications. For Fir and Spruce, seed production in the coming year can be estimated from the number of flower buds and their ratio to vegetative buds; for Pine, from the crop of young cones in the preceding winter.

1564. Clark, M. B. **Studies on seed-dispersal of Douglas Fir.** *For. Res. Rev. B.C. For. Serv. 1957/58*, 1958 (19–20).

Thirty-six 2-ft.-square metal seed-traps, laid out in a randomized block design on the margin of an open stand, and 36 others to study dispersal from single trees, showed 38% of total seed-fall to occur in Sept. and 46% in Oct. Only 27% of seed dispersed was filled, 87% of which fell within 1 chain of its source. In the study of single seed-trees it was found that 82% of total seed-fall occurred in a pattern encompassing a radius of 1 chain round the tree and 3 chains to the S.E. of it.

1565. Gavrilenko, B. D. O rasprostranenii semjan železnogo dereva (*Parrotia persica* C.A.M.). [**Seed dispersal of *P. persica*.**] *Bot. Ž.* 43 (6), 1958 (867–9). 4 refs. [Russ.]

An illustrated description. Explosive dehiscence of the capsules propels the seeds over distances of 10–12 m.

1566. Bartels, H. Untersuchungen über die Hitzetoleranz der Koniferensamen. [**Investigations on the heat tolerance of conifer seeds.**] *Forstwiss. Cbl.* 77 (9/10), 1958 (287–94). 19 refs. [G.g.]

Experiments showed the heat tolerance of *Pinus sylvestris* seeds to be less than that of *Picea abies* and *Larix decidua* seeds in the range 53° to 73° C. and at relative humidities < 95%, but greater at 60° and 100% r.h. In *P. sylvestris* and *P. nigra* the endosperm had a greater heat tolerance than the embryo, but the heat tolerance of embryo and endosperm was the same in *P. abies*, *P. sitchensis*, *L. decidua*, *L. leptolepis* and *Pseudotsuga taxifolia*. No connexion could be found between the heat tolerance of embryo and endosperm and their equilibrium m.c. at 60% r.h. and 25° C. *From author's summary.*

1567. Nikolaeva, M. G. Biologija prorastanija semjan jasenja (*Fraxinus*) v svjazi s sistematičeskim položeniem i rasprostraneniem ego vidov. [**The biology of seed germination in *Fraxinus* and its relation to the taxonomic position and distribution of species of this genus.**] *Bot. Ž.* 43 (5), 1958 (679–83). 19 refs. [Russ.]

Distinguishes 5 groups of species differing in behaviour as regards dormancy (including the influence of pericarp, seed-coat and embryo), and points out that these groups agree well with taxonomic groupings, uniting species that are phylogenetically or geographically close to one another. The relationships are illustrated in a diagram.

1568. Stanley, R. G. **Gross respiratory and water uptake patterns in germinating Sugar Pine [*Pinus lambertiana*] seed.** *Physiol. Plant., Copenhagen* 11 (3), 1958 (503–15). 25 refs. [E.e.]

Water and O uptake, respiratory quotients, and dry weight, were determined during the first 72 hr. of germination (at 30° C.) of Pine seed, both unstratified and stratified for up to 3 months at 5°, from which the outer seed-coat and inner, papery membrane had been removed. In unstratified seed, water uptake was rapid during the first 12 hr., levelling off from 12 to 60 hr., after which there was another rapid increase in absorption. O uptake followed the pattern of water absorption, with a low uptake during the first two phases, and an increase

after 60 hr. Changes in the respiratory quotient, however, in the second phase, indicated enzymatic activity during this period. The pattern of changes occurred more rapidly in stratified seeds, which appear to be at an advanced point on the germination-respiratory activity curves. Water absorption increased at a steady rate without levelling off, and the increase in O uptake occurred at 4–24 hr. The significance of the lag period in germination is discussed.

1569. Räder-Roitzsch, J. E. Quantitative Stoffänderungen bei der Keimung von *Pinus silvestris* L. **[Quantitative changes of substances in the germination of *P. sylvestris*.]** *Forstwiss. Cbl.* 76 (7/8), 1957 (229–45). 26 refs. [G.g.]

Data are given on quantitative changes in the fresh weight, dry weight, and m.c., and in the contents of oil, starch, crude protein, protein N and non-protein N, crude fibre, and total ash, in germinating Pine seeds. [Cf. *F.A* 20 No. 126.]

1570. Genkel′, P. A., and Fan, I.-S. [Fang, I.-H.] O fiziologičeskom značenii viviparii u rastenij mangrov. **[On the physiological significance of vivipary in Mangroves.]** *Acta bot. sinica* 7 (2), 1958 (51–70). 21 refs. [Chin.Russ.chin.russ.]

Research included investigations on the resistance of epidermal cells of several different species of Mangroves to NaCl solutions, and on the Cl content of different parts of Mangrove plants.

1571. Šubin, V. I. K voprosu o roste sosny i eli na organičeskom substrate. **[The growth of Pine and Spruce on an organic substrate.]** *Trudy Karel′-skogo Filiala Akademii Nauk SSSR* No. 7, 1957 (127–33). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (3), (No. 10558). [Russ.] H.S.B.

Pine and Spruce seedlings from seed sown naturally or artificially on decayed tree stumps in Karelia grew well only if the roots developed mycorrhizae or penetrated to the soil. Spruce showed better growth than Pine; its root hairs were longer and denser, so that they were better able to utilize nutrients from the organic substrate, and mycorrhiza formation was abundant throughout the rooting system. Pine seedlings with sparse mycorrhiza formation died in their third year. The difference in growth between natural regeneration of Pine and Spruce was less pronounced on undisturbed humus, owing to the presence of decomposition products in considerably greater quantity.

1572. Boyce, S. G., and Parry, R. E. **Effects of seedbed conditions on Yellow-Poplar regeneration.** *J. For.* 56 (10), 1958 (751–3). 12 refs.

In a statistical study, the germination rates and seedling mortality of controlled sowings of *Liriodendron tulipifera* on (*a*) undecomposed organic matter, (*b*) decomposed organic matter, (*c*) soil, A horizon, (*d*) soil, B horizon, were observed on (1) a well wooded area and (2) a field. Germination and survival were better in all cases on (2) than on (1), and better on (*b*) and (*c*) than on (*a*) and (*d*).

1573. Nikišin, F. M. Biologičeskie osobennosti semjan i vegetativnoe razmnoženie Salicaceae umerennoj zony. **[Biological features of the seeds and vegetative reproduction of Salicaceae in the temperate zone.]** *Bot. Ž.* 43 (10), 1958 (1473–8). 11 refs. [Russ.]

Discusses seed germination, seedling growth, and vegetative propagation of several species of *Salix* and *Populus*.

181.6. Life Form, Habit. Post-Seedling Development and Form

See also Nos. 1541, 1582–3, 1809, 1914, 1935, 2171, 2180.

1574. Müller, G. Untersuchungen über die Querschnittsformen der Baumschäfte. 2. **[Investigations on the cross-sectional shapes of tree boles. Part 2.]** *Forstwiss. Cbl.* 77 (1/2), 1958 (41–59). 13 refs. [G.g.]

[Cf. *F.A.* 20 No. 834.] The frequency distribution curves of maximum and minimum d.b.h. for 2447 stems showed that on level ground the orientation of these diameters in all tree species is determined by the direction of the prevailing wind. In Oak on slopes, the direction of slope is more important than the prevailing wind. In mixed stands (mainly Silver Fir and Spruce with a little Beech and Maple), wind is generally more important than slope in determining the direction of maximum d.b.h. The possibilities of using the frequency distribution of maximum and minimum d.b.h. for meteorological purposes are discussed.

1575. Kalgin, P. G. Mnogostvol′nost′ u kaštana. **[Multiple stems in Chestnut.]** *Priroda, Moskva* 47 (9), 1958 (110–1). [Russ.] A.P.B.

In the forests of the N. Caucasus *Castanea sativa* trees are sometimes found in groups of 2 or 3 (sometimes 4 or 5) stems, apparently not of coppice origin, on one root-system. Nursery experiments showed that 13·3–13·5% of the seed sown gave seedlings with $>$ 1 stem, from buds which developed near the base of the original stem.

181.7. Duration, Longevity, Stature; Records of Exceptional Age or Size. Effects of Age on Behaviour

1576. Møller, C. M. Über die Bedingungen für das Erreichen hohen Alters bei Waldbäumen. **[The conditions for attaining great age in forest trees.]** *Forstwiss. Cbl.* 76 (11/12), 1957 (335–60). 8 refs. [G.g.]

Suggests possible contributory factors: natural strength and durability of the wood; the ability to produce epicormic branches; resistance to parasites; and, in view of the striking differences between maximum tree ages in Europe and the U.S.A., the climate and comparative lack of human interference.

1577. Macko, S. Zabytkowe drzewa w dolinie Baryczy na dolnym Śląsku. **[Historical trees in the Barycz Valley in Lower Silesia.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (465–74). [Pol.]

Brief notes, giving dimensions, location etc., of 77 trees (including many Oaks) remarkable for their size or age.

1578. STECKI, K. Cisy w Nowogardzie w woj. szczecińskim i sprawa inwentaryzacji zabytkowych drzew na zachodzie Polski. [**Yews in Nowogard (Szczecin), and the question of drawing up inventories of ancient trees in W. Poland.**] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (273–80). 51 refs. [Pol.russ.e.]

Describes the two Yews (70 and 56 cm. in diam.) and several other large, ancient specimens, and urges the compilation of an inventory of trees of historical interest.

1579. GUSEJNOV, A. M. Lipa-velikan. [**A giant Lime tree.**] *Priroda, Moskva* 47 (8), 1958 (118). 1 ref. [Russ.] A.P.B.

A specimen of *Tilia dasystyla* growing in Beech/Hornbeam forest at 1400 m. altitude in the basin of the Mazym-Chay river, Azerbaijan, had a height of 40 m. and a d.b.h. of 2·2 m. Its age was estimated at ca. 300 years.

181.8. Phenology

See also Nos. 1439–40, 1442, 2271.

1580. GULISAŠVILI, V. Z. Stadijnost' v razvitii drevesnyh porod. [**Stadial development of tree species.**] *Uspehi Sovremennoj Biologii, Moskva* 38 (3), 1954 (359–79). 42 refs. [Russ.] L.S.

Alternating periods of dormancy and growth as necessary stages in the development of tree species are discussed. From experiments with 4- to 5-year-old potted plants, species from tropical, subtropical, temperate and cold regions of the U.S.S.R. are classified as (*a*) '*ozimyj*', i.e. requiring a spell at lower temperatures ($< 10°$ C.) before higher temperatures will bring the plant out of dormancy, or (*b*) '*jarovoj*', i.e. those that will break dormancy without the influence of lower temperatures when kept at $\not< 10°$. Tables show the lapse of time before flushing (1) of species of group (*b*) in the described laboratory conditions, (2) of branches cut from trees in nature at the beginning, middle and end of the dormant period. The number of successive shoots produced in a growing season by 63 species in different climatic conditions is tabulated. The theory is advanced that the species of group (*b*) were evergreens in the past, but as the climate grew colder they became deciduous. The need for low temperatures before dormancy can be broken in group (*a*) has been developed in response to cold climates. [Cf. *F.A.* 17 No. 1325.]

1581. PARKE, R. V. **Seasonal periodicity in growth and development of the shoot tip of *Abies concolor* Lindl. and Gord.** *Abstr.* in *Journal of the Colorado-Wyoming Academy of Science, Denver* 4 (9), 1957 (36–7).

The annual sequence of tip growth can be divided into three phases: (1) the rest phase, from October to April, during which the telescoped shoot remains in a state of suspended growth; (2) the first growth phase, April to mid-June, when the telescoped shoot elongates rapidly and gives rise to numerous cataphylls; and (3) the second growth phase, mid-June to October, when shoot elongation is completed and a new unelongated axis bearing many needle primordia is formed. Four clearly definable cyto-histological zones of the shoot apex are described.

1582. THOMAS, J. B. **The production of Lammas shoots on Jack Pine in Ontario.** *For. Chron.* 34 (3), 1958 (307–9). 5 refs.

In mid-July 1955 an unusual growth condition was noticed on Jack, White, Red, and Scots Pine reproduction in Lake Nipigon region, being most prevalent on Jack Pine. Many lateral and some terminal buds set for 1956 broke dormancy, and produced new shoots 1–6 in. long. On these, new terminal and, in most cases, lateral buds were formed. All stems examined had two growth rings in 1956 in portions where Lammas growth had occurred. [Cf. *F.A.* 19 No. 3965.]

1583. PÉTER-CONTESSE, J. Quelques remarques sur la pousse de la Saint-Jean chez le fayard. [**Notes on Lammas shoots of Beech.**] *Schweiz. Z. Forstw.* 109 (10), 1958 (587–92). 1 ref. [F.g.]

The author discusses (*a*) his observations, made chiefly in the forests at Boudey (Jura) on non-calcareous moraine soils, showing that bad stem form and quality are frequently caused by Lammas shoots; and (*b*) the morphology and physiology of formation of Lammas shoots, particularly the highly individual and unpredictable response of trees to insolation. He urges further research. *From author's summary.*

1584. PAŞCOVICI, V., and MOCANU, V. Staţiune naturală de *Quercus robur* L. var. *tardiflora* Cern. in R.P.R. [**A natural site of *Q. robur* var. *tardiflora* in Rumania.**] *Rev. Pădurilor* 1958 (5), (294–5). 7 refs. [Rum.russ.g.f.e.]

Includes phenological observations on dates of flushing, flowering, fruiting, leaf-fall and seed dispersal, for *Quercus robur*, *Q. sessiliflora* and *Q. robur* var. *tardiflora.*

1585. ŞTEFĂNESCU, P. Un nou ecotip de stejar foarte tardiv identificat la Ocolul Silvic Tîrgu-Mureş (*Quercus robur* var. *tardissima*). [**A new, very late flushing ecotype of Oak identified in the Tîrgu-Mureş forest district (*Q. robur* var. *tardissima*).**] *Rev. Pădurilor* 1958 (6), (335–8). [Rum. russ.g.f.e.]

Gives ecological and mensurational data on a stand of Oak that flushes and flowers between 20 May and 1 June (compared with 2–8 May for var. *tardiflora* and 11–16 April for var. *praecox*). The stand increment and resistance to disease are both higher than those of the other varieties.

1586. FOMÍN, F. Aspecto fenológico de los *Eucalyptus* del parque 'Pereyra Iraola'. [**Phenology of Eucalypts in the 'Parque Pereyra Iraola'.**] [*Pap.*] *I^as Jorn. argent. Eucalipto Asoc. for. argent.* No. 246–200, 1957. pp. 4. [Span.]

Observations on times of flowering and fruiting, and a comparison with flowering times in Australia.

182. Synecology, Plant Sociology: General, Principles and Methods

182.1. Palaeoecology. History of Vegetation. Pollen Analysis

See also Nos. 1364, 1617–8, 1622.

1587. MARCHESONI, V. Importanza del pino nero, dell'abete, del tasso, e del'agrifoglio nella storia climatico-forestale dell'Appennino Umbro-Marchigiano. **[The importance of *Pinus nigra*, *Abies alba*, *Taxus baccata* and *Ilex aquifolium* in the climatic and forest history of the Apennines of Umbria and the Marches of Ancona.]** *Monti e Boschi* 9 (10), 1958 (535–40). 4 refs. [It.f.e.]

Discusses changes in vegetation on the basis of pollen analyses. The present predominance of Beech and the regression of *Quercus cerris*, Yew and Holly are attributed to human interference. The former existence of natural mixed Fir/Beech and of *Pinus nigra* as an endemic species is demonstrated.

1588. KAC, N. JA., and KAC, S. V. K istorii flory i rastitel'nosti sevȩra Zapadnoj Sibiri v posleledniковoe i pozdnelednikovoe vremja. **[On the history of the flora and vegetation of N.W. Siberia in the late-glacial and post-glacial ages.]** *Bot. Ž.* 43 (7), 1958 (998–1014). 22 refs. [Russ.e.]

Reconstructs the history of the forests on the basis of pollen diagrams and macro-fossils from peat-bogs and sediments.

1589. BEALS, H. O. **Buried forests of Indiana.** *Abstr.* in *Proc. Indiana Acad. Sci.* 67, 1957 (1958), (103). L.S.

A number of forest beds buried under advancing glaciers during the Pleistocene have recently been exposed by erosion, road cuts etc., and are described by glacial geologists. Wood-anatomy investigations indicate that these forests were mostly conifers of a Spruce-Larch type.

1590. BRAY, J. R. **Climax forest herbs in prairie.** *Amer. Midl. Nat.* 58 (2), 1957 (434–40). 22 refs. B.A.P.

The presence of climax forest herbs in prairie in the Middle West was established, and is thought to give support to the theory that the forest extent was greater in the prairie-peninsula region in the recent post-glacial period.

182.2. Succession, Alternation and Periodicity in Vegetation

See also No. 1618.

1591. OINONEN, E. A. Kallioiden muurahaisista ja niiden osuudesta kallioiden metsittymiseen Etelä-Suomessa. **[On rock ants, and their contribution to the afforestation of rocks in S. Finland.]** *Acta entomologica fennica, Helsinki* No. 12, 1956. pp. 212 + 9 tbls. 100 refs. [Fi.e.*e.*] I.I.E.

Ant species and population densities were determined on several sample rocky areas in Finland. Optimum conditions for ants occur when 20–60% of the plant cover of the rock is at the lichen stage, and 40–80% at the moss stage. The only ant of silvicultural importance by virtue of its building activity is *Lasius flavus*. The origin of the nest constituents, and the structure, growth and size of *L. flavus* nests were investigated in detail. The structure and location of the nests are favourable for the natural establishment of tree seedlings (Spruce, and especially Pine), the roots of which can usually be retained by the nests for the first 5–10 years, and in some cases for > 20 years. The root aphids associated with the Pines provide food for *L. flavus*, which in turn creates new sites for Pine seedling establishment. Plant survival on nests was determined for various aspects, and the damage to tree and seedling roots by the ants assessed. In former times, periodic fires destroyed vegetation on the rocks, but over the last 20 years, better fire prevention and control techniques in Finland have protected the rock forests, thus allowing the continuous formation of organic soil constituents. This natural process of afforestation on ants' nests is compared to the artificial one of mound planting, used for afforesting mountain slopes in Central Europe. There is a 30-page English summary.

1592. JAROŠENKO, P. D. Smeny rastitel'nogo pokrova Zakavkaz'ja. **[Natural succession in the vegetation of Transcaucasia.]** Izdatel'stvo Akademii Nauk SSSR, Moscow & Leningrad. 1956. pp. 242. 274 refs. [Russ.] Price *Roubles* 11.25.

Describes natural successions in the region with reference to deserts and semi-deserts, forests and open woodlands, steppes and high mountains, in connexion with soils and climatic changes and the activity of man. It is concluded that if the main reason for the trend towards a continental climate in Transcaucasia has been the unplanned, destructive activity of man in earlier times, then the planned improvement of vegetation and land use by the present regime should prevent further worsening of, and possibly improve, climatic conditions. There are indexes of the botanical names of plants (7 pages) and animals (1 page).

1593. MONK, C. D. **An interpretation of a mature Oak forest in the Piedmont of New Jersey.** *Abstr.* in *Bull. ecol. Soc. Amer.* 39 (3), 1958 (77). A.P.B.

A study in the 65-acre Hutcheson Memorial Forest, an area uncleared since the colonization of N. America. Studies indicate that the cessation of fire in Oak forests of the New Jersey Piedmont may decrease the rate of Oak regeneration and favour the establishment of Sugar Maple.

1594. BEIDLEMAN, R. G. **Fire burn succession studies in the northern Colorado Rockies.** *Abstr.* in *Journal of the Colorado-Wyoming Academy of Science, Denver* 4 (9), 1957 (39).

Studies were made on Spruce/Fir near Arapaho Peaks and on Lodgepole Pine in Glacier Basin, R.M.N.P., over a 10-year period. The Spruce/Fir fire occurred about 1915, leaving a small forested glade, gradually reforested peripherally. In 1946 there were 31 Engelmann Spruce and 45 Subalpine Fir > 1 in. in diam. among the trees succeeding the fire, and younger trees were predominantly Fir. In a 100-sq.-ft. quadrat in 1946 there were 150 young trees, 83 Spruce and 67 Fir, the largest 7 in. tall, but the majority of young seedlings were Fir. In a 6-sq.-ft. section of this quadrat in 1946 there were 5 Spruce and 3 Fir, the tallest 3 in., and in 1956, 33 young trees, with Fir predominating, their average

10-year growth being 4½ in. In the 1946 Glacier Basin burn, a 40-sq.-ft. quadrat contained 33 young Lodgepole Pine, 2–24 in. tall, in 1953, and in 1956, still 33 trees, with an average height increase of 7 in., and one tree 38 in. tall. The tallest post-burn Pines on this area by 1955 were 49 in.; trees, some < 18 in. tall, were bearing maturing ♀ cones by 1954.

1595. REED, J. C., JR., and HARMS, J. C. **Rates of tree growth and forest succession in the Anchorage-Matanuska Valley area, Alaska.** *Arctic, Montreal* 9 (4), 1956 (238–48). 3 refs. B.A.P.

In the course of drawing up a forest-cover map, data were collected on forest types and their distribution, and rates of growth. It was concluded that soil type and superficial geology are relatively unimportant in controlling distribution of vegetation in the area, as compared with occurrence of fires and availability of seed immediately after a fire. Growth rate is controlled by the amount of sunlight and the drainage characteristics of the site. Cottonwood and Aspen had the highest growth rates observed. Drainage conditions apparently affect the growth of White Spruce more than that of Birch. Black Spruce had the lowest growth rate. In the area studied, a mixed Birch/White Spruce forest is generally self-perpetuating. Only in small areas have pure White Spruce stands developed from this association.

1596. KOMENDAR, V. I. Harakter verhn'oji meži lisu na hrebti Čornogora v Radjans'kyh Karpatah. **[The upper forest limit in the Chernogor range of the Eastern Carpathians.]** *Botaničnyj Žurnal, Kyjiv* [*Kiev*] 12 (4), 1955 (75–83). 19 refs. [Ukr.russ.] A.P.B.

The forests are of Spruce, Beech, and occasionally *Pinus cembra*, their upper limit being at 1500–1550 m. alt. on S. slopes, and 1450–1500 m. on N. slopes. In places the upper forest margin is bordered by subalpine meadows; in others by *P. mugo* var. *mughus* and *Alnus viridis* scrub. Where there is no heavy grazing, the forest is spreading over open areas, but, wherever intensive grazing occurs, forest growth is being depressed.

1597. KRJUČKOV, V. V. O gidrotermičeskih uslovijah na verhnih granicah subal'pijskogo i lesnogo pojasov v Hibinskih gorah. **[The hydrological and thermal conditions at the upper limits of the sub-alpine and forest belts in the Khibiny mountains [Kola Peninsula].]** *Bot. Ž.* 43 (6), 1958 (876–89). 27 refs. [Russ.]

Gives the results of measurements made over a period of 2–3 years of the temperatures of the soil and air, and of trunks and branches (at a depth of 1–1·5 cm. in the wood), and of precipitation, wind, and snow depth, on (*a*) a south-facing slope, at 600 m. alt. at the upper limit of Birch (*Betula kusmischeffii* and *B. tortuosa*) scrub; (*b*) on the same slope at 470 m., at the upper limit of Spruce (*Picea* [*abies* f.] *fennica*)/Birch forest; (*c*) in the Spruce/Birch forest in the valley at the foot of the slope, at 370 m.; (*d*) on a north-facing slope at 400 m., at the upper limit of Spruce/Birch forest. It is concluded that thermal considerations do not alone determine the vertical zonation of vegetation types: neither Birch nor Spruce reaches its probable thermal limit, the chief adverse factors being lack of moisture (through excessive natural drainage) and strong winds at the higher altitudes.

1598. MUHINA, L. I., and PREOBRAŽENSKIJ, V. S. Polosy v gornoj tajge Zabajkal'ja. **[Strip formations in the mountain taiga of the Trans-Baikal region [Siberia].]** *Priroda, Moskva* 47 (7), 1958 (101–2). [Russ.] A.P.B.

Describes the occurrence of strips of Larch on raised ridges, 10–20 m. wide, extending along the slopes and alternating with treeless strips, 0·5–1·5 m. lower in level, covered with mosses and lichens. These formations, considered to be due to solifluction, are found at 1400–1800 m. alt.

182.4. Layer Communities

1599. BARDEL, M. La forêt de buis du domaine de Coudrée, propriété de l'École Nationale des Eaux et Forêts. **[The Box forest of the Coudrée estate belonging to the École Nationale des Eaux et Forêts.]** *Rev. for. franç.* 10 (10), 1958 (631–9). 7 refs. [F.]

Describes an ancient stand (300–400 years) of arborescent *Buxus sempervirens* under a sparse overstorey of Oak, Ash, Lime etc. on lacustrine sand dunes near the Lake of Geneva.

1600. CULBERSON, W. L. **Variation in the Pine-inhabiting vegetation of North Carolina.** *Ecology* 39 (1), 1958 (23–8). 14 refs.

The bark vegetation at breast height was sampled on 5 Pines at each of 88 points along a 435-mile E.–W. transect across the state. Frequencies were determined for 66 lichens and 10 bryophytes on 6 species of Southern Pine.

1601. PASSARGE, H. Vergleichende Betrachtung über das soziologische Verhalten einiger Waldpflanzen. **[Comparison of the sociological behaviour of some forest plants.]** *Arch. Forstw.* 7 (4/5), 1958 (302–15). 26 refs. [G.g.russ.e.]

On the basis of the author's own, and other surveys of quasi-natural mixed Oak forest from Poland to Holland, across the Central European plain, the constancy (% of quadrats in which they occur) of *Maianthemum bifolium*, *Moehringia trinervia*, *Trientalis europaea*, *Luzula pilosa*, *Hedera helix*, *Carex digitata* and *Anemone hepatica* in a number of Oak associations, is shown in tables and diagrams. This constancy is accepted for a particular region, where other conditions allow of it, as a criterion of sociological amplitude (based on requirements when living with commensals) as distinct from ecological amplitude (based on demand on site conditions other than biotic). It is shown for these plants that sociological amplitude (and with it frequency) increases as the centre of natural distribution of the indicator plant is approached. The implications of these findings on the value and limitations of these plants as indicators for various branches of applied vegetation studies are discussed.

182.5. Synecological Measurements and Methods

1602. DANSEREAU, P. **A universal system for recording vegetation.** *Contr. Inst. Bot. Univ. Montréal* No. 72, 1958. pp. 52 + 1 dgm. 28 refs. [E.]

An exposition of the author's system for classifying vegetation on a structural basis. [Cf. *F.A.* 13 No. 162.]

187. Vegetation Types

See also Nos. 1374–6, 1517, 1521, 1532, 1552, 1592, 1595–8, 1601, 2152, 2186.

1603. HORVAT, I. Prilog poznavanju borovih i smrekovih šuma Male Kapele. [**Pine and Spruce forests at Mala Kapela [Croatia].**] *Šum. List* 82 (7/9), 1958 (225–50 + 1 tbl.). 25 refs. [Croat. croat.g.]

An ecological study with a table showing the floristic composition of the *Helleboreto-Pinetum*, a relict Pine (*P. sylvestris/P. nigra*) forest community on slopes below 1000 m. alt. at Mala Kapela in the Beech/Fir forest region of Croatia. It occurs as the permanent stage on very dry rendzinas over dolomite or limestone; on moister sites it is transitional. Data are also given, and briefly discussed, on the *Piceetum dolomiticum*, found in the same area, though much less widespread, at 85–1200 m. alt.

1604. SOČAVA, V. B. Novaja geobotaničeskaja karta Rumynii. [**The new geobotanical map of Rumania.**] *Bot. Ž.* 43 (5), 1958 (629–38). 13 refs. [Russ.e.]

Gives brief notes on the compilation of the map (scale 1: 600,000), and discusses some phytogeographical conclusions which can be drawn from it.

1605. DONIȚA, N., *et al.* Legenda 'Geobotaničeskoj Karty Rumynskoj Narodnoj Respubliki' (m. 1: 600,000). [**The legend of the 'Geobotanical Map of Rumania' (scale 1: 600,000).**] *Bot. Ž.* 43 (5), 1958 (639–43 + 1 plate). [Russ.e.]

Twenty-nine types of vegetation are defined, 2 in the high-montane zone, 6 in the montane zone, and 21 in the hills, plateaux and plains. All these are listed, together with the botanical names of the main tree species, in the 1-page English summary. A sample portion of the map is reproduced in colour.

1606. MOLSKI, B. Rezerwat przyrody w leśnictwie Grzędy. [**The nature reserve in the Grzędy forest area.**] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (161–77). 25 refs. [Pol.russ.e.]

The following forest associations are found in the area: *Sphagnetum medii pinetosum, Pineto-Vaccinietum uliginosi, P.-V. myrtilli, Pineto-Quercetum serratuletosum, Querceto-Carpinetum medioeuropaeum, Fraxineto-Alnetum, Alnetum glutinosae typicum*, and *Salix aurita-Frangula alnus*.

1607. MYCZKOWSKI, S. Klasyfikacja siedlisk w lasach górskich w Polsce na przykładzie Karpat zachodnich. [**Classification of mountain forest types in Poland, taking the W. Carpathians as an example.**] *Sylwan* 102 (9), 1958 (13–30). 2 refs. [Pol.russ.e.]

Outlines the nature and importance of the task, and describes the *Querceto-Carpinetum, Pineto-Quercetum, Abieteta, Fagetum carpaticum, Luzulo-Fagetum, Piceetum tatricum abietetosum, Phyllitideto-Aceretum* and *Piceetum excelsae* of the W. Carpathians, the value of the mountain forests, and their care and management.

1608. STOJKO, S. M. Pro pryrodni lisostany skel'nogo duba (*Quercus petraea* Liebl.) v pojasi bučyn Zakarpattja. [**The natural stands of *Q. sessiliflora* in the Transcarpathian Beech belt.**] *Botaničnyj Žurnal, Kyjiv* [*Kiev*] 12 (4), 1955 (66–74). 19 refs. [Ukr.russ.] A.P.B.

Reports investigations of relict stands of *Q. sessiliflora* in the *Fagus sylvatica* belt between 600 and 1000 m. alt. In drier and less fertile areas, competition from the Beech is less severe. Most of the Oak stands discussed were on dry, stony slopes facing south.

1609. LAVRENKO, E. M. O položenii lesnoj časti Kavkaza v sisteme botanikogeografičeskogo rajonirovanija Palearktiki. [**On the position of the wooded parts of the Caucasus in the phytogeographical division of the Palaearctic.**] *Bot. Ž.* 43 (9), 1958 (1237–53). 50 refs. [Russ.]

Examines the literature [ca. two-thirds Russian] and tends to the opinion that phytogeographically the Caucasus is mainly Mediterranean in type.

1610. MAHATADZE, L. B. Dubravy Armenii. [**Oak forests of Armenia.**] Izdatel'stvo Akademii Nauk Armjanskoj SSR, Erevan. 1957. pp. 327 + 2 tbls. 11 pp. of refs. [Russ.]

A monograph in two parts. Part I includes descriptions of the Oak species occurring in Armenia, their distribution, the forest types in which they occur, and the physical properties of the soils of some of these types. Part II deals mainly with the silviculture of the different forest types and of plantations. It also includes data on the seed-bearing habits of Oak in Armenia, insect and fungal pests, and the physical and mechanical properties of the wood.

1611. ČAZOV, B. A. O geografii lesov Kungurskogo rajona Molotovskoj oblasti. [**The forest geography of the Kungur region of Molotov province.**] *Učenye Zapiski Molotovskogo Universiteta* 11 (2), 1957 (145–54). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (4), (No. 15336). [Russ.] H.S.B.

Discusses species composition—mainly Spruce, with some [Siberian?] Fir, Pine, Birch and Aspen—by % of forest area occupied, forest types and site class.

1612. HAMITOV, K. I. Geobotaničeskie dannye o širokolistvennyh lesah Baškirskogo Urala. [**Geobotanical data on broadleaved forests of the Bashkirian Urals.**] *Učenye Zapiski Marijskogo Gosudarstvennogo Pedagogičeskogo Instituta* 10 (3), 1956 (49–81). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (3), (No. 10290). [Russ.] H.S.B.

Discusses factors governing the horizontal and vertical distribution of broadleaved species, and classifies the forest types according to composition and soil type, with some recommendations on regeneration of Oak and the conversion of poor hardwood stands to Pine or Pine/Larch.

1613. KOLESNIKOV, B. P. Kedrovye lesa Dal'nego Vostoka. [**The *Pinus koraiensis* forests of the Far East [of the U.S.S.R.].**] *Trudy Dal'nevostočnogo Filiala im. V. L. Komarova* (*Ser. bot.*),

Akademija Nauk SSSR, Moskva No. 2 (4), 1956. pp. 261. 305 refs. [Russ.] Price *Roubles* 15.55.

Reviews earlier classifications of the pure and mixed *Pinus koraiensis* forests in the area, discusses the importance of these forests to the resources of the region, their range, the characteristics of the tree and of the forests, and the classification of the forests in the Maritime Province (with a key to the forest types), and concludes with some recommendations on silviculture and principal lines for research.

1614. Geografičeskij sbornik VIII. Rastitel'nyj pokrov Sahalina. [**Geographic symposium VIII. The vegetation of Sakhalin.**] Izdatel'stvo Akademii Nauk SSSR, Moscow & Leningrad. 1956. pp. 114. Many refs. [Russ.]

Six articles covering various regions of, or particular types of vegetation on, Sakhalin. The scientific names of all the species mentioned are listed alphabetically.

1615. McLean, A., and Holland, W. D. **Vegetation zones and their relationship to the soils and climate of the Upper Columbia Valley.** *Canad. J. Pl. Sci.* 38 (3), 1958 (328–45). 15 refs. O.R.E.

Precipitation appears to be the principal factor governing soils and vegetation development. Three main vegetation zones were distinguished: Cedar/Hemlock, Spruce/Fir, and Douglas Fir (*a*) groveland, and (*b*) forest, and described in some detail.

1616. Hoff, C. C. **A comparison of soil, climate, and biota of conifer and Aspen communities in the central Rocky Mountains.** *Amer. Midl. Nat.* 58 (1), 1957 (115–40). 12 refs. B.A.P.

A study was made during spring and summer 1947 in (*a*) Aspen groves and (*b*) adjacent coniferous forest in Wyoming and Colorado. The Aspen groves included young to mature stands of *Populus tremuloides* var. *aurea*. The coniferous forests were either climax or subclimax; the climax was of *Pinus ponderosa* at lower elevations or a mixture of chiefly *Picea engelmannii* and *Pseudotsuga taxifolia* at higher elevations; subclimax was of *Pinus contorta* var. *latifolia*. No consistent differences were found in relative humidity, air temperature or light intensity during the growing season. At lower elevations where the *P. ponderosa* stands were rather open, there was a higher evaporation rate among the Pines than among the Aspens. At higher elevations, where the conifer stands were denser than the Aspen the reverse was true. There was no definite difference in soil texture or temperature, but the soil of (*a*) was consistently more alkaline and contained more moisture and organic C. Micro-invertebrate populations seemed to be about the same in density. Populations of most groups of macro-invertebrates, except the Coleoptera, were higher in (*a*) than in (*b*). Snails, earthworms and millipedes were relatively few in (*b*) soil and litter. More than twice as many kinds of spiders were found in the (*a*) as in (*b*) soil and litter, and the population density was $>$ 3 times greater in (*a*). Higher populations and a slightly greater number of species of ant were found in the (*a*) soil and litter. Adult beetle populations were about the same in both. It appears therefore that Aspen, along with associated vegetation, exerts a considerable modifying influence upon the soil.

1617. Kilburn, P. D. **Historical development and structure of the Aspen, Jack Pine and Oak vegetation types on sandy soils in northern Lower Michigan.** *Abstr. of thesis*, in *Dissert. Abstr.* 19 (3), 1958 (422). O.R.S.

1618. Mark, A. F. **An ecological study of the grass balds of the southern Appalachian mountains.** *Abstr. of thesis*, in *Dissert. Abstr.* 19 (3), 1958 (424). O.R.S.

Presents a suggested explanation of the presence of high-altitude grasslands (mainly in a narrow band at about 5,400 ft., the altitude of the relatively abrupt transition between hardwood and coniferous forest), on well drained areas, below the climatic tree-line. Balds probably originated during a post-xerothermic period of cooling climate, through agents of forest destruction; their maintenance depends on the relative severity of the treeless environment, lack of a Spruce/Fir seed source in certain areas and possible elimination of lower-margin biotypes in other areas, and on grazing and browsing. Bald extension results from destruction of the marginal forest by natural and artificial agencies. Tree invasion into ungrazed balds indicates that they are just within the tolerance ranges of certain species and may eventually become forested. Spruce and Fir are invading more rapidly than hardwoods, and the highest balds without a Spruce and Fir seed source may persist longer than those having such a source or those occurring at lower altitudes.

1619. Padula, M. Brevi considerazioni sulla foresta tropicale umida e sulla messa a coltura dei suoi terreni. [**Some brief considerations on tropical rain forest and the effect on its soils of conversion to agriculture.**] *Riv. Agric. subtrop. trop. Firenze* 52 (7/9), 1958 (419–31). 16 refs. [It.it.e.] E.M.B.

Summarizes the distribution of the type, the principal climatic, edaphic, and vegetational features, and the erosion resulting from converting to agriculture.

1620. Fedorov, A. A. Vlažnotropičeskie lesa Kitaja. [**The tropical rain forests of China.**] *Bot. Ž.* 43 (10), 1958 (1385–408 + 7 plates). 33 refs. [Russ.e.]

Describes these forests in S. Yunnan and on Hainan Island (S. part), which have been examined by Sino-Russian biological expeditions in 1955–57. They occur as isolated strips on the slopes of river valleys, but sometimes also on level sites at 450–800 m. alt. There is some doubt whether they constitute a climax vegetation, but they possess all or nearly all the characters of tropical rain forest as given by Richards [cf. *F.A.* 14 No. 211]. The forests are evergreen and usually 4-storeyed, the tallest trees (40–50 m.) being *Antiaris toxicaria* and *Chikrassia tabularis* in S. Yunnan, and *Vatica astrotricha* and *Tarrietia parvifolia* in Hainan. The characteristic composition of the storeys is outlined, lianas, Bamboos and rattans described, and the evergreen subtypes *Knema/Garcinia*, Lauraceae and

Meliaceae are tentatively defined. The forests closely resemble those of Burma, apart from the almost complete absence of Dipterocarpaceae (only 3 species of *Hopea* and one of *Vatica* were found).

1621. SAHNI, K. C. **Mangrove forests in the Andaman and Nicobar Islands.** *Indian For.* 84 (9), 1958 (554–62 + 2 maps, 2 plates). 14 refs.

The Andamans have ca. 1136 sq. km. of Mangrove forest, the Nicobars ca. 35. These forests are described, and a key to the Mangrove genera (based on superficial characters) is given. The principal products are firewood, charcoal, tanbarks, dyebarks etc., but conventional methods of extraction are impracticable. Suggestions are made on using small boats and lighters with winches to extract the poles.

1622. LAURENT, R. F. À propos de l'origine des esobe de la forêt equatoriale. [**The origin of the *esobe* of the tropical forest.**] *Folia scientifica Africae centralis* 1 (4), 1955 (13). [F.] From *abstr.* in *Rapp. Inst. Rech. sci. Afr. cent. Bruxelles 1955*, 1958 (237).

The herpetological fauna of these areas of grassland is very similar to that of the savanna, which indicates that the *esobe* are vestiges of savanna that have been encircled by forest.

1623. TRAPNELL, C. G. **Climatic types of vegetation in Southern Kenya.** *Rep. E. Afr. Agric. For. Res. Organ. 1957*, 1958 (56–8).

A major field reconnaissance has been carried out of the vegetation types of the Nyanza, Southern, and Rift Valley Provinces and part of the Central Province of Kenya S. of lat. 1° N., in order to obtain an over-all classification of the climatic types of vegetation. The range of vegetation types found was considerably greater than previous publications indicated. Types hitherto insufficiently recognized include semi-evergreen thicket and thicket-forest types towards the Lake Victoria shore, and various evergreen and semi-evergreen thicket, scrub and scrub-grassland types fringing the forest region of the central highlands. The distribution of major vegetation types in Kenya, though subject to soil factors, is primarily controlled by climate, but from a land-use point of view the ultimately desirable unit of classification may be considered to be the vegetation/soil unit, which covers both the climatic and soil aspects of land potential.

2. SILVICULTURE

See also Nos. 1495, 1522–4, 1526, 1610, 1613, 1861, 2350–2.

1624. KOLPIKOV, M. V. Lesovodstvo s dendrologiej. [**Silviculture and dendrology.**] Goslesbumizdat, Moscow & Leningrad. 3rd ed. (rev.) 1954. pp. 496. 19 refs. [Russ.]

The 3rd edition (revised, rearranged and expanded) of a textbook already noticed [see *F.A.* 7 No. 1698]. A species index has been added, and the bibliography and illustrations pruned.

1625. GRAYSON, A. **Northerwood Conference, 1–4 May 1958. The management of coniferous crops.** *Forestry* 31 (2), 1958 (194–201).

Summarizes the discussions at this conference of growers, consultants, timber merchants, and technologists, on the management of coniferous crops with particular attention to the economic production of sawtimber.

1626. HAUSENDORFF, E. Grundsätzliches zur Kiefernwaldwirtschaft und zur Waldwirtschaft überhaupt. [**Principles of Scots Pine management and forest management in general.**] *Forstarchiv* 29 (10), 1958 (217–23). 8 refs. [G.]

The author examines the findings of Olberg [see *F.A.* 19 No. 247] and confirms from personal experience the advisability of converting the N. German Pine forests from a clear-felling system to one of continuous management based on natural regeneration.

1627. HANZL, D. Proširenje jele na Papuku. [**Extending the range of Silver Fir in the Papuk Mts.**] *Šum. List* 82 (7/9), 1958 (282–90). 14 refs. [Croat. croat.g.]

Argues in favour of increasing the % of Fir, at present occupying only a small area of the 74,600 ha. of forest land (mainly Beech/Oak/hardwoods) in the Papuk Mts., Jugoslavia. Measures suggested are tending and releasing of the regeneration and young stands, and sowing where necessary.

1628. KALGIN, P. G. Kaštanovye nasaždenija Severnogo Kavkaza i puti ih ulučšenija. [***Castanea sativa* stands in the N. Caucasus, and their improvement.**] *Lesn. Hoz.* 11 (1), 1958 (36–9). [Russ.]

Describes, and illustrates in a map, the distribution of Chestnut, which is found in several types of forest on some 18,500 ha., only 7·3% of which consists of pure stands. Silvicultural characteristics are described and recommendations made on management. In stands managed for the nuts, the yield is 3–4 tons/ha. if the crowns of the trees are kept clear of each other. Introduction of the large-fruited form might double this yield. The author also suggests management as coppice-with-standards, the coppice to furnish wood for tannin extracts, and the standards for high-quality timber.

1629. GLØERSEN, F. Noen betraktninger omkring dansk og norsk ekeskogbruk. [**Observations on the management of Oak forests in Denmark and Norway.**] *Dansk Skovforen. Tidsskr.* 43 (9), 1958 (449–62). [Nor.]

Compares the treatment of Oak in Norway and Denmark after the felling of the virgin Oak forests. In S. Norway, the young Oak stands have developed from coppice managed first for tanbark and then for fuel. Thinning treatments to convert these stands to protective high forest are discussed; preliminary figures for dimensions and yield, compared with those from Denmark for stands of similar age and site class, suggest that this can be done successfully.

1630. SCHMITZ-LENDERS, B. Mein Pappel-Testament. [**My Poplar testament.**] J. D. Sauerländers Verlag, Frankfurt a./M. 1956. pp. xii + 188. 87 refs. [G.]

Summarizes the author's life-long experience and research on Black Poplar hybrids, the main varieties, propagation, growth etc., with special reference to the Harff Poplar, a *Populus* × *regenerata* from the Lower Rhine Valley, including a report on site trials on spoil mounds, in windbreaks etc. Part II is an enlarged and revised version of the author's volume and yield tables [cf. *F.A.* 10 No. 2334] for single trees and wide-spaced plantations of this Poplar. A translation of a treatise on Lombardy Poplars by P. de Saint-Maurice (Paris, 1769) is annexed.

1631. JOACHIM, H.-F. Die Pappelwirtschaft in Ungarn. [**Poplar growing in Hungary.**] *Holz-Zbl.* 84 (131), 1958 (1674–7). [G.]

A report on a study, discussing natural and cultivated species and varieties, propagation (including irrigated nurseries for White Poplar), grafting of Grey Poplars on White Poplar stocks, Poplar sites, silvicultural treatment, yields, diseases, utilization, research, etc.

1632. **Management of bottomland forests.** *Proc. 7th For. Symp. La. Sch. For.* 1958. pp. 114.

Bottomland hardwoods constitute ca. one-fifth of the forest area in the Southern states (ca. 37 million acres). The papers in the present symposium [some of which are noticed separately in this issue of *F.A.*] cover regeneration, tending, and utilization.

1633. **Recommendations of the all-India Teak study tour and symposium, December 1957–January 1958.** *Indian For.* 84 (10), 1958 (593–602).

Recommendations are made for the regeneration, tending and management of the different types of Teak forest and plantation. The full proceedings of the symposium are to be published separately.

22. Silvicultural Systems. Constitution and Composition of Stands; Forms of Stand

221. High Forest Systems

See also Nos. 1355, 2119, 2199.

1634. POBEDINSKIJ, A. V. Vozobnovlenie lesa na koncentrirovannyh vyrubkah. [**Regeneration of forest on areas subjected to 'concentrated fellings'.**] Goslesbumizdat, Moscow & Leningrad. 1955. pp. 92. 67 refs. [Russ.] Price *Roubles* 2.85.

Covers the soil changes caused by skidding, air temperatures near the ground on felled areas, the effect of skidding on regeneration, methods to ensure natural regeneration on these areas, direct sowings, and the organization of logging work so as to assist regeneration.

1635. MOLOTKOV, P. I. Rubki glavnogo pol'zovanija v gornyh lesah Karpat. [**Principal fellings in forests in the Carpathian Mts.**] *Bjulleten' naučno-tehničeskoj Informacii UkrNIILHA, Har'kov* No. 1, 1956 (5–10). [Russ.]

Analyses the state of the Beech regeneration and soil before and after felling done by various systems on steep slopes. The advantages of systems of successive regeneration fellings or selection fellings over clear fellings, are held to outweigh the damage caused by these systems to the residual stand.

1636. IVANENKO, B. I. Rubki glavnogo pol'zovanija v gornyh lesah severnogo Kavkaza. [**Principal fellings in mountain forests of the N. Caucasus.**] *Sbornik Rabot po lesnomu Hozjajstvu Vsesojuznogo Naučno-Issledovatel'skogo Instituta Lesovodstva i Mehanizacija Lesnogo Hozjajstva* No. 32, 1956 (86–98). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (3), (No. 10588). [Russ.] H.S.B.

Investigations in the Krasnodar and Stavropol regions in N. Ossetia showed that clear fellings in the last 20 years have led to the replacement of valuable Oak forest by less valuable trees and shrubs. In order to prevent erosion, a change from clear felling to selection and sanitation fellings is recommended for Oak stands on S., S.W. and S.E. aspects in the foothills. In Oak forest of higher site classes, clear felling or the shelterwood system with 2–3 regeneration fellings may be applied. Satisfactory natural regeneration of *Fagus orientalis* is obtained only by shelterwood fellings uniformly reducing the density to 0·5, preferably in 2–3 stages. For Fir [*Abies nordmanniana*?] forests, shelterwood or selective fellings are recommended.

1637. KUGELBERG, V. Skärmställning och överståndare. [**Shelterwood systems and reserve trees.**] *Svenska SkogsvFören. Tidskr.* 56 (3), 1958 (267–92). 7 refs. [Sw.]

Computations based on investigation of good Pine sites (Jonsson's class II and III) in Södermanland indicate that it is generally profitable to leave ca. 35 seed trees/ha. as reserves for up to 20 years after the establishment of natural regeneration, and that loss of increment and logging damage in the young stand are small.

1638. HALAJ, J. [Editor]. O vyberkovych lesoch na Slovensku. [**Selection forests in Slovakia**] Slovenska Akademia Vied, Bratislava. 1958. pp. 222 + 36 photos. [Slovak.russ.g.]

Papers from a symposium held at Strač in 1956, mainly by Czech authors on selection forest, with special reference to Slovak conditions. More general papers [by foreign participants] include: Selection forest in Hungary (*G. Roth*); Selection forest in central Germany (*J. Blanckmeister*); Significance and applicability of mathematical/statistical inventories of stocking and increment (*A. Richter*); Bases and validity of the principles of selection forest (*H. Leibundgut*); and An evaluation of selection fellings (*N. P. Anučin*). The resolutions of the conference on selection forests in Slovakia are summarized.

1639. KENNEDY, R. F. **Natural reproduction following seed tree cutting in bottomland hardwood forests.** *Proc. 7th For. Symp. La. Sch. For.* 1958 (16–20).

Preliminary results of experimental fellings indicate that a seeding felling, leaving 6–8 seed trees/acre where the trees are large, and 8–12 where they

are smaller, ensures good regeneration and is preferable to selection cutting in stands with much low-quality material.

1640. MAISENHELDER, L. C. **Natural regeneration following selection cutting in bottomland hardwoods.** *Proc. 7th For. Symp. La. Sch. For.* 1958 (21–6).

Includes notes on the ill effects of fire, grazing and weed growth, the need for fencing and release, and favouring the species best suited to a particular site.

1641. HUTNIK, R. J. **Three diameter-limit cuttings in West Virginia hardwoods, a 5-year report.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 106, 1958. pp. 13. 3 refs.

An appraisal of results in largely second-growth stands, 5 years after felling to 16, 13 and 8 in. d.b.h., along with elimination of undesirable stems $> 4\frac{1}{2}$ in., discussing comparative increment, recruitment and regeneration, mortality etc. Future management should be by the selection system.

1642. MERZ, R. W., and BOYCE, S. G. **Reproduction of upland hardwoods in southeastern Ohio.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 155, 1958. pp. 24. 4 refs.

Reproduction was sampled in 1955 on 100 milliacre plots per treatment after (*a*) heavy, (*b*) light, and (*c*) clear fellings in 90-year-old Oak/Hickory forests in 1953–54, reducing stand b.a. to (*a*) 32 sq. ft., and (*b*) 52 sq. ft./acre. Oaks (*Quercus coccinea, Q. stellata, Q. rubra*) and Yellow Poplar [*Liriodendron tulipifera*] formed most of the regeneration, the % of Yellow Poplar being highest for (*c*). It is concluded that the group-selection system, creating openings of ca. $\frac{1}{2}$ to 1 acre, should ensure adequate reproduction. Other species, Hickories, Red and Sugar Maples, Black Cherry, Beech etc., formed ca. 20% of the reproduction in all treatments.

1643. STETTLER, R. F. **Development of a residual stand of interior Spruce-Alpine Fir [*Picea glauca/Abies lasiocarpa*] during the first twenty-eight years following cutting to a 12-inch-diameter limit.** *Res. Note B.C. For. Serv.* No. 34, 1958. pp. 15.

Wind caused serious losses, particularly in the remnants of the upper canopy, especially with slender Spruce poles, and amounted to 100% on some plots. Surviving trees showed significantly higher radial (release) growth than controls, the Fir giving better results than the Spruce, though the bulk of release growth was on poor-quality stems. For the stand as a whole, accelerated rate of growth of residual trees did not compensate for the reduction in b.a. due to increased mortality. Advance reproduction, particularly of Spruce, suffered a considerable reduction, and height growth of surviving stems was very slow. Subsequent establishment of regeneration was obviously favoured by piling and burning of slash. Spruce seedlings showed a definite preference for spots of exposed mineral soil, and the species ratio of Fir/Spruce changed from 6 : 1 in 1929 to 3 : 1 in 1957. It is concluded that the next harvest will be recruited largely from stems established after the 1929 felling. The residual stand probably provided some seed and shelter, but was of little value as part of the next timber crop.

222. Coppice, Pollarding and Lopping Systems

See also No. 1645.

1644. PODELMENGO, O. Sul trattamento del pino mugo. **[The silvicultural treatment of *Pinus montana* var. *mugo*.]** *Monti e Boschi* 9 (11), 1958 (603–7). [It.f.e.]

In view of the importance of this species in the Alps (1) as protective forest, (2) as a source of essential oil, the author recommends that clear felling should be resorted to only when it is necessary to regenerate the stand, and that as a rule a system of lopping should be practised.

226. Changes of Silvicultural System. Conversion (by System or Species)

See also Nos. 1629, 1957.

1645. AUBERT, P. Un heureux exemple de conversion en futaie dans une forêt privée. **[A successful example of conversion to high forest in a private forest.]** *Rev. for. franç.* 10 (8/9), 1958 (526–32 + 3 photos). [F.]

Describes the conversion of Oak coppice to naturally regenerated Oak high forest with some admixture of planted, quick-growing, conifers (*Abies grandis, Tsuga heterophylla, Picea abies, Pseudotsuga taxifolia* etc.) at Beaumont-les-Autels (Eure-et-Loire).

228. Constitution and Composition of Stands; Choice of Species and Form of Mixture; Tree Classes; Forms of Stand

See also Nos. 1379, 1434, 1548, 1834, 2152, 2171, 2200, 2203.

1646. **Silviculture of pure and mixed forests. FAO study tour, Czechoslovakia 24 July to 18 August 1956, final report.** FAO, Rome. *FAO Report* No. 859, 1958. pp. 76.

In addition to a general account of natural conditions in Czechoslovakia, includes (1) study-tour findings on ecology, silvicultural measures, management, economics and protection of pure stands, and (2) reports on experience with pure and mixed stands in Austria, Burma, Finland, France, India (West Bengal and Madhya Pradesh), Indonesia, Italy, Japan, Switzerland, Turkey, U.S.S.R. and Jugoslavia.

1647. EVERS, K. Zur Standortskartierung im Hornisgrinde-Gebiet. **[Remarks on site mapping in the Hornisgrinde area [High Schwarzwald].]** *Allg. Forst- u. Jagdztg.* 129 (10), 1958 (205–11). 8 refs. [G.e.]

Opposes the views expressed by R. Jahn [see *F.A.* 19 No. 22] particularly his recommendations to convert pure Spruce into mixtures with Silver Fir predominating, arguing that the climate, particularly the strong W. winds, makes Spruce, which here does not degrade the soil, the most suitable species. Jahn's statements on the gradual reduction of raw humus are doubted.

1648. NAUMENKO, I. M., BICIN, L. V., and KARLIN, V. R. Sostojanie, vozrastnaja struktura i proizvoditel'nost' starovozrastnyh bukovyh nasaždenij Severnogo Kavkaza. **[Condition, age structure and productivity of old Beech stands in the N. Caucasus.]** *Lesn. Hoz.* 11 (1), 1958 (10–6). [Russ.]

Gives a detailed description of the two main types of Beech forest that are being exploited. Many of the stands are mature or over-mature, and Hornbeam regeneration is replacing Beech on large clear-felled areas.

1649. STIELL, W. M. **Pulpwood plantations in Ontario and Quebec.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1770 (*F*-2), 1958. pp. 42. 21 refs.

A survey was made in 1955–56 to determine survival, development, and the reasons for success or failure, of conifer plantations (mainly *Picea glauca*) ranging from 1 to 32 years. The small size of the samples precluded many general observations, but it was found that the bulk of mortality occurred within the first 4 years of planting, unfavourable site and climate being the most frequent causes of failure. Tabulated data on height, volume etc. are given, and the annual dominant height growth above b.h. is compared with that of the Petawawa plantations. [Cf. *F.A.* 17 No. 2677.]

1650. EIĆ, N. Prašuma Peručica. **[The Peručica virgin forest.]** *Šumarstvo* 11 (5/6), 1958 (328–36). 9 refs. [Serb.e.f.]

Notes on the species composition and volume of an area (1050 ha.) of virgin forest at Peručica, S.E. Serbia, composed chiefly of conifers (Silver Fir, Spruce, Pine) with some Beech, recommending its preservation as a nature reserve.

23. Regeneration and Formation of Stands

231. Natural Regeneration

See also Nos. 1355, 1521, 1571–2, 1634–40, 1642–3, 2031–2, 2099.

1651. LIZARDO, L. **Natural regeneration in Pine [*Pinus insularis*] forests.** *Philipp. J. For.* 11 (3/4), 1955 (1957), (211–25 + 8 photos). 3 refs.

A study of these forests leads to the conclusion that cut-over areas will regenerate naturally if 10–15 well distributed seed-trees are left per acre, and grass fires, shifting cultivation, and grazing excluded from the regeneration area.

1652. CAYFORD, J. H. **Scarifying for Jack Pine regeneration in Manitoba.** *Tech. Note For. Br. Can.* No. 66, 1958. pp. 14. 9 refs.

The following results were obtained from two experiments, (*a*) on a sandy and (*b*) on a clay soil: (1) Scarification followed by scattering of fresh cone-bearing slash resulted in moderate initial stocking on both (*a*) and (*b*), though rather better on (*a*), where clear-cut areas had best stocking; seed-tree areas were intermediate and clear-felled strips poorest. (2) Scarification after scattering of cone-bearing slash was not successful on (*a*) or (*b*); regeneration was little or no better than on unscarified areas. (3) At least 15 cones among slash scattered on mineral soil were usually required to produce a single 1-year-old Jack Pine on sandy soil. *From author's summary.*

1653. WARD, R. T. **Reproductive habits of the American Beech in Wisconsin.** *Abstr.* in *Bull. ecol. Soc. Amer.* 39 (3), 1958 (87). A.P.B.

The habit of root suckering by Beech is well known. In certain stands in Wisconsin, especially those without a conifer element and with a mull humus type, reproduction of this kind much exceeds that of true seedlings. The latter appear to be restricted to more northern stands in which the humus tends toward a mor type. Distributional, quantitative and age information on the two types of reproduction is presented.

1654. HAAREN, VON. Die Technik im Dienste der Buchennaturverjüngung. **[Mechanization promotes natural regeneration of Beech.]** *Forst- u. Holzw.* 13 (19), 1958 (380–3). 3 refs. [G.]

Reviews the possibilities of soil scarification and cultivation in Beech stands with tractor-mounted, spring-tine cultivators and grubbers, and rotary cultivators driven by power take-off, examining also costs and the relative merits of contract work and work with the estate's own machinery.

1655. DOLUHANOV, A. G. Estestvennoe vozobnovlenie buka v osnovnyh tipah bučin Gruzii. **[Natural regeneration of Beech in the main Beech forest types of Georgia.]** *Trudy Tbilisskogo Botaničeskogo Instituta Gruzinskoj SSR* No. 18, 1956 (69–114). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (4), (No. 15348). H.S.B.

The amount and quality of natural regeneration varies in the different forest types according to the density of canopy and development of the underwood and herbaceous cover. Conditions for regeneration are most favourable on fresh sites; on moister sites, seedlings are suppressed by the grass cover. Regeneration appears to occur irregularly (2- to 4-year cycle). The most important cause of mortality is insufficient light.

1656. MIŠNEV, V. G. Količestvennaja ocenka vozobnovlenija pod pologom elovo-grabovyh dubrav BSSR. **[A quantitative estimate of regeneration under canopy in the Oak/Spruce/Hornbeam forests of Belorussia.]** *Sbornik Naučnyh Rabot po Lesnomu Hozjajstvu, Institut Lesa BSSR* No. 7, 1956 (147–54). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (4), (No. 15349). [Russ.] H.S.B.

Studies in 1951–53 showed that natural regeneration of Oak was mostly unsatisfactory. Mast years are comparatively rare (every 4–5 years) and almost all the seedlings die before the next mast year, so that less valuable hardwoods occupy the felling sites. Of the species associated with Oak, Maple and Hornbeam showed the best regeneration. Ash, Lime and Elm, and also Spruce, were represented in small %s. Light is considered the decisive factor for regeneration of all the species represented.

1657. **[Natural regeneration of Kauri (*Agathis macrophylla*).]** *Rep. For. Dep. Brit. Solomon Isles Protect. 1957*, [1958] (4).

Further observations have confirmed that plentiful Kauri seedling regeneration exists in unexploited forest and that it is shade-tolerant. The best prospects for regeneration would seem to lie in so controlling exploitation that not only the Kauri seedlings but also the lower and middle canopies over them, are disturbed as little as possible; plus poisoning in the overwood after exploitation to release the young Kauri. In areas where felling has been relatively heavy, it will probably be best to allow regrowth to form a low canopy over surviving Kauri seedlings before attempting release.

1658. WYATT-SMITH, J. **Seedling/sapling survival of *Shorea leprosula*, *Shorea parvifolia* and *Koompassia malaccensis*.** *Malay. Forester* 21 (3), 1958 (185–93). 5 refs.

Results are presented of the continuation of research work [cf. *F.A.* 11 No. 1751] on the abundance, growth and survival of seedlings on two sample plots, one to study *S. parvifolia* and *K. malaccensis* seedlings in plant succession after farming [taungya], established 1946, the other to study *S. leprosula* seedlings on an area of lowland Dipterocarp forest, burnt over a year prior to establishment in 1940 and subsequently treated [canopy opened] in part in 1949. The main conclusions are that seedlings of *S. parvifolia* and *K. malaccensis* have a high mortality rate under suppressed conditions for 3–4 years, after which the rate slows down considerably; that a fair, maybe adequate, proportion of all 3 species considered can survive and grow under suppressed conditions for about 10 years; and that the survival and height growth of 4- to 6-year-old *S. leprosula* seedlings is significantly improved by an opening of the canopy above them. *Author's summary.*

1659. MORAES, L. ALVARES DE, and PINHEIRO, J. VIEIRA. Observaciones preliminares sobre la época de corte para el eucalipto en el estado de San Pablo, Brasil. **[Felling season for Eucalypts in the state of São Paulo, Brazil.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 227–200, 1957. pp. 3 + 3 tbls. [Span.]

Experiments showed no relationship in this region between season of cutting *Eucalyptus saligna* coppice, rainfall, and number of coppice shoots appearing 6 months after cutting.

232. Artificial Regeneration

See also Nos. 1452, 2653, 2660.

1660. COZZO, D. El cultivo de bosques de *Araucaria angustifolia* en la Provincia Argentina de Misiones. **[The creation of *A. angustifolia* stands in Misiones province, Argentina.]** *Rev. for. argent.* 2 (2; 3), 1958 (55–64; 85–9). 4 refs. [Span.]

Presents the results of studies on a considerable number of artificially regenerated stands of *A. angustifolia* in Misiones. A brief history is given of the exploitation of the original forest, the methods used in artificial regeneration are described, and data are presented on growth and development from 32 different stands. In general, a m.a.i. of 20 cu. m./ha. can be expected from stands 10–15 years old, with an initial stocking of 2000 stems/ha. Seed selection and the relative merits of direct sowing and of planting are discussed, along with variations in growth in different regions, and the course of future research.

1661. Costo de implantación de un pinar. **[Cost of establishing *Araucaria angustifolia*.]** *Bol. argent. for.* 15 (152), 1957 (14). 1 ref. [Span.]

Tabulates the cost, during each of the first 5 years, for planting 25 ha., under the heads of estate housing and maintenance, preparation of the ground, seed, sowing and beating up, tending (including ant destruction) and overheads. Costs for the first 25 ha. are $12.559/ha. and for the next and succeeding 25 ha. $9.597/ha., the total cost of establishing 200 ha. (in 12 years) being $2,012·656, of which 9·5% is for land, 54·0% for planting, 31·3% for interest and 5·2% for protection.

1662. **Gaylord's planted Pines.** *Timberman* 59 (11), 1958 (76 . . . 82).

Covers the history and the annual planting acreage since 1920 of this 145,000-acre man-made forest, said to be the largest in the U.S.A. Situated at Bogalusa, Louisiana, the plantations are increased by ca. 10,000 acres annually, mainly with Slash and Loblolly Pine, 1 + 0 seedlings, machine- and hand-planted by Crown Zellerbach. Details of planting, management and staffing etc. are included.

1663. TARIEL, J., and GROULEZ, J. Les plantations de limba au Moyen-Congo. **[Plantations of *Terminalia superba* in the Middle Congo.]** *Bois For. Trop.* No. 61, 1958 (9–25). [F.]

A plantation programme was initiated in 1950, and 700 ha. have so far been planted. Methods of establishment, initial growth, and costs are described and discussed.

232.1. Choice and Trial of Species, Races etc.

See also No. 1454.

1664. HAUSENDORFF, E. Zum Handel mit Forstsaatgut und zur Einführung fremdländischer Baumarten nach Europa in der zweiten Hälfte des 18. Jahrhunderts. **[Traffic in tree seed and the introduction of exotic trees into Europe during the second half of the 18th century.]** *Silvae Genet.* 7 (5), 1958 (159–61). 6 refs. [G.]

1665. MEURICE, C. La culture des résineux dans la vallée du Samson. **[Growing conifers in the valley of the Samson.]** *Bull. Soc. for. Belg.* 65 (11), 1958 (701–8). [F.]

Describes some small conifer plantations in the valley of this tributary of the Meuse. The soils are mainly calcareous and most broadleaved trees do well. It is concluded that there is a small place for Spruce in converting unprofitable Hornbeam coppice, and that Larch might do on some sites, but that no case exists for general planting of conifers.

1666. AUNG DIN, U. **Pines for tropical areas.** *Unasylva* 12 (3), 1958 (121–33). 33 refs.

Discusses the distribution of tropical Pines with regard to climate and altitude, and mentions the species found in Asia, Africa and America. An

account is given of experience with tropical Pines introduced into other tropical regions, and the practices adopted with them, together with a list of 15 Pines suitable for planting in various climatic regions within the tropics. [Cf. *F.A.* 20 No. 1506.]

232.11. Species Trials, including Forest Gardens, Trials of Exotics etc.

See also Nos. 1523–5, 1542–4, 1697, 1772, 1785, 1792, 2048, 2172, 2182, 2634, 2671.

1667. **[Introduced species in the N.W. German region near the coast.]** *Ber. Tag. nordwestdtsch. Fortstver., Oldenburg 1957*, [1958]. pp. 103. 36 refs. [G.]

Papers read at the 1957 meeting at Oldenburg of the N.W. German Forestry Society, including: Forestry conditions in Oldenburg (*Willms*); Planting *Abies alba* in the coastal region (*G. D. Schmidt*); Douglas Fir and Western Hemlock (*Hoppenstedt*); The planting of exotics in the N.W. German coastal region (*H. Gerhard*), and The consequences of introducing exotics into N.W. Germany, particularly the coastal region (*E. Schimitschek*) [abstracted separately—see *F.A.* 20 No. 2048].

1668. DIMPFLMEIER, R. Winterfrostschäden 1955/56 im Forstlichen Exotenversuchsgelände Grafrath. **[Frost damage in 1955–56 in the Grafrath Forest Exotics Trial Area.]** *Forstwiss. Cbl.* 76 (5/6), 1957 (174–87). 3 refs. [G.g.]

The damage caused by temperatures sinking to — 29·5° C. is described individually for 26 coniferous and 45 broadleaved exotic species, which are also tabulated in 5 groups according to the severity of damage, from seriously damaged to unharmed.

1669. QUERENGÄSSER, F. A. Die pazifische Edeltanne *Abies procera* Rehd. (*Abies nobilis* Dougl.-Lind.) [***Abies procera.***] *Holz-Zbl.* 84 (114), 1958 (1453–7). 25 refs. [G.]

Discusses site and climatic requirements, provenances, suitable regions for introduction and silvicultural uses (pure or mixtures) in Germany, planting and tending, yield, utilization etc., including yield data from a small 60-year trial plot at Diez in the Rhineland.

1670. BÉRARD, A. À propos du pin Weymouth. [***Pinus strobus* in Europe.**] *Rev. for. franç.* 10 (11), 1958 (677–85). 25 refs. [F.]

A review of the literature, with special reference to introductions in France and recommending its extended use in reforestation at the expense of Spruce.

1671. BUGAŁA, W. Północnoamerykańskie topole sekcji *Tacamahaca* Spach i ich uprawa w Europie. **[N. American Poplars of the section *Tacamahaca* in Europe.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (359–81). 15 refs. [Pol.russ.e.]

Discusses *Populus acuminata*, *P. angustifolia*, *P. balsamifera*, *P. candicans* and *P. trichocarpa*, giving synonyms, botanical description, general characteristics, natural range, and behaviour in Europe, with particular reference to Poland. None of the species grows well in Poland, owing to frost damage and attack by rusts. It is probable that the specimens of *P. trichocarpa* in Poland are the typical Californian species, and it is suggested that *P. t.* var. *hastata* from Oregon, Washington, or British Columbia might grow well in Poland.

1672. AKIMOČKIN, N. G. Rost i produktivnost' topolej v severnoj časti central'noj lesostepi. **[The growth and yield of Poplars in the northern parts of the central forest-steppe region [of Russia].]** *Lesn. Hoz.* 11 (2), 1958 (21–5). [Russ.]

Gives results of trials. On moist rich soils *Populus* × *berolinensis*, and *P. balsamifera* were best, giving a m.a.i. of ca. 45 cu.m./ha. On drier, poorer soil on S.E. slopes, and on poor eroded soil, *P. simonii* and 'Moscow Poplar' gave the best results. The other varieties tried on some or all of the sites were *P.* × *'canadensis'*, *P. suaveolens*, *P.* 'Eucalyptus', *P. alba* and *P. nigra* var. *italica*.

1673. KLENOV, N. N. Opyt ispol'zovanija bystrorastuščih porod v kul'turah Belgorodskogo leshoza. **[Using fast-growing species in plantations on the Belgorod Leskhoz.]** In *Sbornik: Povyšenie produktivnosti lesnyh ploščadej central'no-černozemnyh oblastej.* Voronezh, 1956. pp. 71–6. [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (3), (No. 10625). [Russ.] H.S.B.

Presents results from trials of fast-growing species for shelterbelts and plantations in the southern forest-steppe in Russia. Three types of shelterbelt were developed: (*a*) Birch with shrubs, for eroded slopes, (*b*) Birch/Oak shelterbelts of the 'corridor' type on more fertile soils, and (*c*) Poplar/Oak on moist soils. Pure plantations are recommended for poor, fairly moist, clay-loam soils on which Oak does not thrive. Poplar, Birch and *Juglans mandshurica* are recommended as admixtures for Oak plantations on fertile soils.

1674. SEDAŠEVA, G. JA. Šelkovica belaja v Baškirii. [***Morus alba* in Bashkiria.**] *Lesn. Hoz.* 11 (2), 1958 (80–1). [Russ.]

A brief account of the introduction of the tree, its use in shelterbelts, resistance to *Malacosoma neustria* attack, and acclimatization. It is recommended especially for shelterbelts and for amenity planting in towns.

1675. KABALIN, S. I. Cennye porody v lesnyh kul'turah Novosibirskoj oblasti. **[Valuable species in plantations in the Novosibirsk region.]** *Lesn. Hoz.* 11 (3), 1958 (45–8). [Russ.]

Gives details of the progress of plantations of *Larix sibirica*, *Pinus sylvestris*, *P. sibirica*, *Picea obovata*, *Populus* spp., *Betula verrucosa*, and *Quercus* [*robur?*], for 5 phytogeographical zones of the region.

1676. PROKOF'EV, A. A. Introdukcija guttaperčenosnogo i lekarstvennogo rastenija évkommii v Tadžikistane. **[The introduction of the gutta-percha-bearing and medicinal tree *Eucommia ulmoides* in Tadzhikistan.]** *Izv. Akad. Nauk SSSR* (*Ser. biol.*) 1958 (5), (610–7). 11 refs. [Russ.e.] A.P.B.

Describes *E. ulmoides*, with notes on its taxonomic position, natural range, and introduction and acclimatization in the U.S.S.R. Necessary site and climatic conditions are outlined, with reference to Tadzhikistan, and methods of cultivation and exploitation are discussed.

1677. MÉTRO, A. Compte rendu des activités des équipes nationales. France. **[Progress reports of National Working Teams. France.]** [*Docum.*] *3rd Sess. Wkg. Party on Eucalypts FAO Jt. Subcomm. Medit. For. Probl., Madrid 1958* No. *FAO/SCM/EU/*12-*C*, 1958. pp. 5. [F.] Limited distribution.

With special reference to frost-hardiness and resprouting of trees of 10 species killed back in 1955-56, of which *Eucalyptus gunnii* is, provisionally, considered the most promising.

1678. Rapports d'activité des équipes nationales. Espagne. **[Progress reports of National Working Teams. Spain.]** [*Docum.*] *3rd Sess. Wkg. Party on Eucalypts FAO Jt. Subcomm. Medit. For. Probl., Madrid 1958* No. *FAO/SCM/EU/*12*A*, *1958*. pp. 17. 99 refs. [F.] Limited distribution.

Includes a full bibliography of literature on Eucalypts published in Spain [oldest item dated 1868].

1679. BOLAÑOS, M. La distribución geográfica de los eucaliptos en la provincia de Huelva. **[The geographical distribution of Eucalypts in Huelva Province [Spain].]** [*Docum.*] *3rd Sess. Wkg. Party on Eucalypts FAO Jt. Subcomm. Medit. For. Probl., Madrid 1958* No. *FAO/SCM/EU/*14-*A*, 1958. pp. 9. [Span.] Limited distribution.

Includes a brief description of the vegetation of the province [the map mentioned in the text is not attached] and the planting of Eucalypts in *matorral* [scrub] areas.

1680. MONJAUZE, A. Note sur le développement des *Eucalyptus* dans certains arboretums de l'Oranie semi-aride froide. **[The development of Eucalypts in some arboreta in the semi-arid cold region of Oran province.]** [*Docum.*] *3rd Sess. Wkg. Party on Eucalypts FAO Jt. Subcomm. Medit. For. Probl., Madrid 1958* No. *FAO/SCM/EU/*14-*Ca*, 1958. pp. 6. [F.] Limited distribution.

Discusses resistance to lime-induced chlorosis and frost, and the growth of numerous species in 3 arboreta at 750–1200 m. alt. *Eucalyptus gunnii*, *E. urnigera*, and *E. johnstonii* were the most promising trees, and *E. melliodora* as a cover species. Planting costs, however, are high and may prove prohibitive.

1681. GUPTA, M. **A note on some Australian *Eucalyptus*, their suitability for planting in U.P. and the results of trials done.** *Indian For.* 84 (10), 1958 (613–6).

Recommends species for different zones (temperate, subtropical, moist plains, semi-dry plains, dry plains) and uses.

1682. DENG, C.-H. Frostfestere Eukalyptus-Sorte in China erzielt. **[Frost-resistant Eucalypts raised in China.]** *Holz-Zbl.* 84 (61), 1958 (806). 3 refs. [G.]

Lists 12 species successfully grown in Kwang-Tung, Fukien, Szechwan and Hunan provinces (lat. 18–28° N.) of which *Eucalyptus viminalis* and *E. tereticornis*, followed by *E. globulus* and *E. cladocalyx*, proved hardiest, and briefly describes acclimatization trials [species not stated] at Changshu (lat. 29° N.) in which a root-thinning technique [not described] was used. The trees, planted in 1933, were killed back to stump level by frost in 1954, but the stool shoots, after a repetition of the treatment, withstood very low temperatures in 1957, and are now 5 m. high. A strangulation technique with steel wire was used to promote early flowering and fruiting. [Cf. *F.A.* 18 Nos. 323, 3920.]

1683. MANGIERI, H. R. El 'pino bunya' (*Araucaria bidwillii* Hook.). [***A. bidwillii.***] *Rev. Invest. for., B. Aires* 1 (4), 1957 (23–8 + 5 plates). 4 refs. [Span.]

Individual examples of *A. bidwillii* planted as ornamentals in Argentina have shown good growth. In a plantation of 116 trees (initial spacing 3 × 3 m.) at the Leandro Forest Experiment Station, N. Alem, individuals have reached in 14 years a height of 10 m. and d.b.h. of 25 cm. More recent plantations at the same station suggest that closer spacing, i.e. 1 × 1 or 1 × 1·5 m., is preferable. Brief notes are presented on silvicultural characters, germination and planting out. Further trials are in progress.

1684. GOLFARI, L. Distribución y ecología de algunos eucaliptos cultivados en la Argentina. **[Distribution and ecology of some Eucalypts cultivated in Argentina.]** *Pap. Iª Jorn. argent. Eucalipto Asoc. for. argent.* No. 237–200, 1957. pp. 9 + 2 tbls., 2 maps. [Span.]

Deals mainly with *Eucalyptus rostrata*, *E. viminalis*, *E. tereticornis*, *E. globulus* and *E. saligna*, their silvicultural requirements and adaptation to conditions in Argentina.

1685. ESTIVILL, R. R., and CERSÓSIMO, F. J. Reseña comparativa de las plantaciones de *Eucalyptus* registradas hasta el presente. **[A comparative report on Eucalypt plantations registered to date.]** [*Pap.*] *Iª Jorn. argent. Eucalipto Asoc. for. argent.* No. 262–200, 1957. pp. 3. [Span.]

Presents data on the growth of Eucalypts from different regions of Argentina.

1686. FOMÍN, F. Las especies de *Eucalyptus* existentes en el parque 'Pereyra Iraola' y algunas observaciones sobre su comportamiento y desarrollo. **[Eucalypts growing in the 'Parque Pereyra Iraola' and some observations on their behaviour and growth.]** [*Pap.*] *Iª Jorn. argent. Eucalipto Asoc. for. argent.* No. 251–200, 1957. pp. 17. [Span.]

Notes on 47 species.

1687. FOMÍN, F. Algunas informaciones sobre los *Eucalyptus* cultivados en distintas zonas de la provincia de Buenos Aires. **[Notes on Eucalypts cultivated in different zones of Buenos Aires province.]** [*Pap.*] *Iª Jorn. argent. Eucalipto Asoc. for. argent.* No. 248–200, 1957. pp. 5. [Span.]

Short notes on 17 species, where found, and their development and suitability to the site.

1688. YACUBSON, D. Los eucaliptos cultivados en la 'Estación Forestal Castelar'. **[Eucalypts cultivated at the Castelar Forest Experiment Station.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 5–190, 1957. pp. 66. [Span.]

A review of the work accomplished in establishing Eucalypts, with notes on climatic conditions and soils, and on the behaviour and development of 101 different species.

1689. IGNATOWICZ, B. Diámetros y altura de los eucaliptos cultivados en la Estación Forestal Castelar. **[Diameters and heights of Eucalypts grown at the Castelar Forest Experiment Station.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 218–200, 1957. pp. 6. [Span.]

Gives age, mean d.b.h. and height measurements (based on from 2 to 781 sample trees) for 108 different species and varieties grown in small groups or stands.

1690. PETRAK, J., and CERSÓSIMO, F. J. Informe sobre los estudios de crecimiento e incrementos volumétricos con las especies *Eucalyptus camaldulensis* y *E. robusta*, en la Estación Forestal Castelar. Feche de medición, Julio 1952. **[Studies of growth and volume increment in *E. rostrata* and *E. robusta* at the Castelar Forest Experiment Station. Date of measuring, July, 1952.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 214–200, 1957. pp. 4 + 2 tbls. [Span.]

Presents measurements made on a plantation established in 1946 and consisting at the time of the study, of 894 stems, and includes calculations of m.a.i./ha.

1691. El género *Eucalyptus* en el Uruguay. **[Eucalypts in Uruguay.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 258–200, 1957. pp. 12. 6 refs. [Span.]

Reviews briefly the introduction and cultivation of Eucalypts in Uruguay.

1692. MATOS GONZÁLEZ, E. Memoria sobre el eucalipto en Cuba. **[Eucalypts in Cuba.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for argent.* No. 221–200, 1957. pp. 8. 11 refs. [Span.]

Notes on location of plantations, acclimatization, plant production, management and utilization. [Cf. *F.A.* 19 No. 294.]

1693. **Notes on exotic trees in Jamaica.** [Forest Department, Jamaica.] 1957. pp. 15. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1694. CAGUIOA, V. **Planting exotic species in the Philippines.** *Philipp. J. For.* 12 (1/2), 1956 (1957), (1–38 + 1 map, 30 photos). 18 refs.

Summarizes available data on date of introduction, present distribution, uses etc. of a large number of introduced tree species.

1695. WESTON, G. C. **Soils in relation to exotic forestry in New Zealand.** *Emp. For. Rev.* 37 (3), 1958 (299–304).

Discusses the interrelations of forest and soil in exotic plantations and emphasizes the necessity of ensuring optimum land utilization by drawing on results of first-crop plantations, fertilizer studies and soil surveys, etc.

232.12. Races and Provenance Trials

See also Nos. 1454–5, 1457–8, 1460, 1462.

1696. LUK'JANEC, V. B. K voprosu o vlijanii proishoždenija želudej na rost i zasuhoustojčivost' sejancev duba. **[The influence of seed origin on the growth and drought resistance of Oak seedlings.]** *Naučnye Zapiski Voronežskogo Lesotehničeskogo Instituta* 15, 1956 (49–55). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (3), (No. 10610). [Russ.] H.S.B.

Seed of two forms of Oak [*Quercus robur*] differing in size of acorn, and of trees from different forest types in the Tellerman forest, were grown in dark-grey forest clay-loam. In their first year, seedlings from parents in the flood-plain and *Aegopodium/Carex* forest types grew best. Seed from the Pine/Oak type and Oak woods on solonetz soil gave the most drought-resistant seedlings. Seedlings of the form of Oak with large acorns, from all forest types represented, grew quicker but wilted earlier in drought (though they recovered better after irrigation) than those from the form with small acorns.

1697. SCHOBER, R. Ergebnisse von Lärchen-Art- und Provenienzversuchen. **[Results of Larch species and provenance trials.]** *Silvae Genet.* 7 (5), 1958 (137–54). 36 refs. [G.g.e.f.]

Compares the results of 29 Larch provenance and species trials in Europe, ranging from 8 to 45 years in duration. With local exceptions, similar results were in general obtained with the same species and provenances in the different trials. In northern and central Europe, best height growth was attained by *Larix leptolepis* and the Sudeten, Tatra and Polish provenances of *L. decidua*, also by eastern Alpine provenances of *L. decidua* from the lower levels of the northern foothills (Blühnbachtal) and the eastern foothills near Vienna, especially from the Wienerwald. Western Alpine provenances, particularly those from the Swiss Valais and the French Alps near Briançon, did not for the most part rival the eastern provenances in height growth. Variations in height growth of the *L. decidua* provenances were considerable and occurred on many site classes. Studies of the incidence of Larch canker showed only *L. leptolepis* to be immune; its hybrids with *L. decidua* were not. *L. gmelinii*, *L. gmelinii* var. *olgensis* and Polish *L. decidua* provenances showed considerable resistance. The Sudeten Larches were almost immune in the Württemberg trials, but were heavily attacked in the Danish and Swedish trials. On the whole, Alpine Larches and *L. sibirica* were most frequently attacked. *From author's summary.*

232.13. Trials of Hybrids and Other Products of Tree Breeding

See also section 165.

1698. LANGNER, W. Vorsicht mit Hybridlärchen. **[Caution with hybrid Larches.]** *Allg. Forstzeitschr.* 13 (45), 1958 (654–5). 11 refs. [G.]

Reports observations on progeny of *Larix* × *eurolepis* which tend to show that their growth is less than that of first-generation crosses, and recommends caution in their use.

232.2. Preparatory Work. Auxiliary Measures

See also Nos. 1786, 1953, 2205.

1699. FREDÉN, E. Maskinell markberedning i norrländskt storskogsbruk. **[Mechanical cultivation in the large forests of Norrland.]** *Norrlands Skogsv-Förb. Tidskr.* 1958 (3), (297–425). 47 refs. [Sw. sw.e.*e.*]

The material used was obtained from surveys, questionnaires, interviews etc., and refers to the period 1953–57; farm forests are excluded, and the material is grouped into 3 areas (N. Norrland, central Norrland, and S. Norrland with Dalarna) which are compared and contrasted. Data given include areas cultivated each year; equipment used (illustrated in an appendix); costs as compared with manual work; and the relative areas sown, planted or regenerated naturally after cultivation. Distance between seed-spots was found to be more irregular when tractor-drawn aggregates were used than with hand-operated motor equipment or hand hoeing; size and depth of spots were satisfactory. General recommendations are made on choice of equipment in relation to size of area, type of terrain etc. Burning-over as a preparation for regeneration was found to be about as expensive as mechanical cultivation; results of planting on burnt-over areas without cultivation were less satisfactory than on those with cultivation, but results of planting on cultivated areas without burning-over were quite satisfactory.

1700. SIN'KEVIČ, M. S. Mehanizacija podgotovki počvy v uslovijah Karelii. **[Mechanized soil preparation in Karelia.]** *Lesn. Hoz.* 11 (1), 1958 (56–8). [Russ.]

Soil-scarification trials were made in clearings in Karelian Pine and Spruce forests, with 'anchor-like' implements of a type previously described [cf. *F.A.* 7 No. 1728; 20 No. 388]. The soil was stony and there were ca. 1000 stumps/ha. Strips 0·7–1 m. wide and 3–3·5 m. apart were worked in May at a rate of ca. 8000 running m. per 8-hour shift with a KT-12 tractor. Conifer seeds were then sown and raked in by hand at a rate of 100 per patch of 0·7 × 0·7 or 0·7 × 1 m. Examination of the sites 2½ years later showed an average of 18 and 20 plants per patch. The results of scarification trials with a horse-drawn 'Zmejka' harrow are also reported. The anchor-type implements are preferred for heavy and stony soils, the harrow for lighter, sandy soils.

1701. WETZEL, M. Warum ist das Sandrohr (*Calamagrostis epigeios* Roth) ein so schlimmes Waldunkraut und wie lässt es sich bekämpfen? **[Why is *C. epigeios* such a harmful forest weed, and how may it be controlled?]** *Dtsch. Landwirtsch.* 9 (10), 1958 (498–500). 4 refs. [G.g.]

A study of the root system in sandy soils and the competition offered to young regeneration. The best control method is ploughing. [Cf. *F.A.* 20 No. 1794.]

1702. GRIFFITH, A. L., and HOWLAND, P. **Effect of *shamba* crops and cultivation.** *Rep. E. Afr. Agric. For. Res. Organ. 1957*, 1958 (91).

The crops used were (*a*) maize, (*b*) beans, and (*c*) maize + beans, in a *Pinus radiata* plantation. The general result at the end of the first year was that *shamba* crops had reduced the growth of the forest crop by ca. 10% in height and had had no appreciable effect on survival %, which was in general 96–98%.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. Seed

See also Nos. 2050–2, 2073, 2095.

1703. **Northwest forest tree seed committee winter meeting.** *Northw. Sci.* 32 (2), 1958 (70). L.S.

The meeting included progress reports on: Determination of cone-maturity by observing the length of the embryos (reported by *Allen* from work in British Columbia by *M. Finnis*); Weight changes in seed as affected by date of collecting, and afterripening of early harvested cones using damp storage (*R. Silen*); Results of seed-sampling experiments and data from various methods of testing germination (*T. M. Ching*). Future research projects are outlined.

1704. ALLEN, G. S. **Factors affecting the viability and germination behaviour of coniferous seed. Part I. Cone and seed maturity, *Tsuga heterophylla* (Rafn.) Sarg. Part II. Cone and seed maturity, *Pseudotsuga menziesii* (Mirb.) Franco. Part III. Commercial processing and treatments similar to processing, *Pseudotsuga menziesii* (Mirb.) Franco, and other species.** *For. Chron.* 34 (3), 1958 (266–98). 12 refs.

(I) Hemlock cones were collected at various dates from 3 trees in 1953 and from another 3 in 1956, the seed was carefully extracted, cleaned, and then tested with or without stratification. Variation in maturation is related to inheritance, but for the collection area and the two years in question, Sept. 15 may be taken as the date when almost all seeds have matured sufficiently to germinate and store well. Results indicated that dates of collection can influence both viability and germination behaviour of Hemlock seed, and this has a bearing on seed testing, since any collection may contain seeds in various stages of maturity. Stratification reduces the variation in rate and hence is useful as a means of standardizing seed tests for species such as Hemlock. (II) Cones were collected from 4 Douglas Fir trees on Aug. 15, Aug. 30, Sept. 15, Sept. 30, and Oct. 10, air dried, and the seed extracted, cleaned by hand and then tested with and without stratification. Results indicate considerable variation in maturity on a given date as between parents. Rate of germination of untreated seed increased with increasing maturity. Stratification appeared to eliminate most 'immature' seed (and that slowest to germinate) in the 'immature' collections, but did not decrease the germinative capacity of 'mature' lots. The implications of the findings for mass cone collection and for precision seed testing are indicated. (III) A number of experiments have been carried out over several years to determine the effects of

cone and seed processing (kilning, extraction, de-winging, cleaning) upon seed viability and germination behaviour. In most cases, processing in commercial plants reduced the germinative capacity of the seed of several coniferous species. Most of the damage appeared to be done during prolonged de-winging or during de-winging of seed that contained a considerable amount of hard, sharp, debris such as cone scales. Processing usually increased the germinative energy of unstratified seed. Seed that had been seriously affected by processing, real or simulated, showed not only a reduction in germinative capacity and an increase in germinative energy, but also weaknesses of the seedlings during germination; radicles were often discoloured and these usually degenerated quickly at 25° C. This behaviour was particularly noticeable after stratification. A number of commercial lots of seed studied have given seedlings similar in appearance and behaviour to those resulting from seed purposely maltreated in the laboratory—the poorer the germinative capacity, the greater the number of discoloured or degenerating radicles. *From author's summaries.*

1705. MESSER, H. [Editor]. Fortschritte des forstlichen Saatgutwesens. **[Progress in forest seed husbandry.]** J. D. Sauerländer's Verlag, Frankfurt a/M. 1956. pp. 117. Many refs. [G.g.] Price *DM*.11.00.

The publication, celebrating the 130th anniversary of the state seed-extraction establishment at Wolfgang, Hesse, contains the following articles: The importance of Hesse local races for the supply of unexceptionable forest seed (*W. Rossmässler*); The production of forest seed in Hesse seed-orchards (*R. Schmitt*); Some arguments for separate extraction of seeds from different stands (*W. Langner*); The seed yield of Larch cones (*E. Rohmeder*); Practical experiences in seed testing at Hann. Münden (*O. Linnemann, H. Meyer*, and *T. Schmucker*) [chiefly on equipment and methods]; Improvements in forest seed-extraction techniques (*H. Messer*) [a review of kilns, de-winging and sorting equipment etc., including the 'Eichhorn' for tearing open Larch cones, the 'Nordmark' de-winger, and the (French) 'Vibragem' sorter and cleaner]; The Wolfgang small-scale 'drum-only' extractor (*R. W. Walkenhorst*); The moisture content of Spruce cones and seed (*H. Messer*) [including its effect on germination after storage]; and The fruiting of Spruce (*H. Messer*) [see next abstract].

232.311. Seed Production (Seed Years, Seed Crops; Seed Orchards and Methods of Inducing Seed Production)

See also Nos. 1455, 1471, 1563, 1705, 2236.

1706. MESSER, H. Untersuchungen über das Fruchten der Fichte (*Picea abies*). **[The fruiting of Spruce.]** In *Fortschritte des forstlichen Saatgutwesens*, J. D. Sauerländer's Verlag, Frankfurt a/M. 1956. pp. 91–117. 22 refs. [G.g.]

Part I reports investigations into the ripening of cones on 5 trees at 330–730 m. alt. in the Taunus range, collected on 11 dates between 1.9.1954 and 8.3.1955. Unripe seed collected in September equalled ripe seed in germinative capacity, except for very early collections at 730 m. alt. which, however, came to full ripeness when stored in their cones. Moisture content of cones, initially 52–62%, decreased slowly during ripening to ca. mid-October, and rapidly thereafter. Cones opened in March when the m.c. had fallen to 18%. There was no difference in maturation between red and green cone types. Part II presents an analysis of cone and seed yields of 115 felled trees aged 130 years, in S.W. Bavaria. Mean yields of cones, % of full seeds and seed weight were greatest for trees in Kraft classes 1 and 2, which together yielded 86% of the total, but mean weight of cones was actually highest in classes 2 and 3. Individual variations were great. Cone size, full-seed content and seed weight decreased towards the top of the crown and the % of seed damaged by *Plemeliella* [*abietina?*] towards the bottom. Total cone yield of this full harvest was 2585 kg. air-dry/ha., containing 115 kg. full seed. Ca. 1000—1500 kg. of cones could have been harvested from the standing tree.

1707. HAGNER, S. Om kott- och fröproduktionen i svenska barrskogar. **[The production of cones and seed in the conifer forests of Sweden.]** *Medd. SkogsforsknInst., Stockh.* 47 (8), 1958. pp. 120. 44 refs. [Sw.sw.e.*e.*]

A review, with a 12-page English summary, based largely on data collected (*a*) by visual sample counts during the forest survey, (*b*) in periodic sample fellings, and (*c*) from annual regional assessments which are discussed, compared and analysed. Production varied considerably, within stands, between trees of similar size and vigour, particularly so in poor years, and more markedly for Pine, where even in good years $> 90\%$ of the crop grew on $< 60\%$ of the trees. Relationships between cone crop and stem diameter are analysed. Cone crops of Pine in good years were about equal in the north and south, but good years were less frequent in the north. Spruce cone crops were much smaller in the north, but less affected by altitude than Pine crops. Good Pine seed (with germination $\geqslant 50\%$) was generally produced up to 64° lat. and 300 m. alt.; further north, quality declined sharply. No correlation between quantity and quality was found in Pine seed, but with Spruce, where altitudinal and latitudinal differences in seed quality were small, quality was better in heavier crops. On the basis of estimates of seed available from annual fellings it is concluded that, with improved collection and present storage and extraction methods, Spruce seed supplies are ample over the whole country, but good Pine seed is likely always to be scarce in the far north. *From author's summary.*

1708. GYSEL, L. W. **Prediction of acorn crops.** *For. Sci.* 4 (3), 1958 (239–45). 2 refs.

Predictions of the crops of the Red Oak group may be possible because of the relatively long maturation period of the acorns (16–18 months after fertilization of the flowers). Prediction of crops of the White Oak group may be shorter, because the period of acorn development is 5–6 months. The present article summarizes 6 years' observations on the flowers and immature and mature acorns of *Q.*

velutina, *Q. rubra*, and *Q. alba*, tabulating for each the flowers and immature acorns (counted through a 30× telescope on each twig in sample areas throughout the crown) and the mature acorns (trapped on the ground) [cf. *F.A.* 18 No. 2738]. It is concluded that there is no infallible method of making an early prediction of the size of mature acorn crops from flowers and immature acorns, though the potential size of the crop can be estimated, and the actual size determined by later observations and check counts.

1709. MADERO, G. E. Posibilidades de cosecha de semillas de *Eucalyptus* en el 'Parque Pereyra Iraola'. **[Possibilities of *Eucalyptus* seed crops in the 'Parque Pereyra Iraola'.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 217–200, 1957. pp. 2. [Span.]

Presents figures for 25 species, based on 6 years' observations.

1710. MATTHEWS, J. D. La sélection et la classification des arbres en génétique forestière. **[Selection and classification of trees in forest genetics.]** *Schweiz. Z. Forstw.* 109 (8/9), 1958 (478–94). 28 refs. [F.g.]

Stresses in particular the practical aspects, illustrated by U.K. practice, discussing criteria used in selection, their determination and description, and giving definitions for plus tree, élite tree and 'special' tree.

1711. **Stimulating Pine flowering by fertilization, cultivation, or release.** *Rep. Sth. For. Exp. Sta. 1957*, 1958 (41–2).

Though fertilizing alone did not significantly increase flowering on individual Slash Pines, cultivated and fertilized plots produced more than twice as many flowers as plots merely cultivated. For both Slash and Longleaf Pines, thinning increased flowering per acre, with a maximum at 45 sq. ft. of b.a. per acre. Increased flowering per tree was insufficient to offset the reduced tree numbers when only 30 sq. ft. of b.a. was left.

232.312. Seed Collection, Extraction and Grading (including Seed Weight)

See also Nos. 1566, 1703–5.

1712. CRAM, W. H. **1957 Report on breeding and nursery research.** Forest Nursery Station, Indian Head, Sask. [1958]. pp. 6. 2 refs.

Maple and Ash seed maturity: Experiments with various dates of collection of seed of *Fraxinus pennsylvanica* (*a*) and *Acer negundo* (*b*) indicated that neither should be harvested in August and that storage conditions between harvesting and sowing (in mid-October) had little influence on viability. Seed of both species harvested in Sept. or Oct. exhibited some dormancy and needed pre-treatment to ensure adequate germination especially if sown in a dry autumn. *Storage of Poplar cuttings*: Cuttings were collected on Oct. 22 from stool beds of 3 clones [species not stated], cut into 10-in. lengths, graded into diameter classes, and tied in bundles of 25. Five pre-storage treatments were applied by dipping the bundles in solutions of fungicides—(*a*) captan, (*b*) Tersan, (*c*) control (water), (*d*) Semesan, and (*e*) oxyquinoline sulphate. They were stored under 5 storage conditions, (1) sand in cellar at 41° F., (2) as (1) but 31°, (3) polythene in cellar at 41°, (4) as (3) but 31°, (5) heeled-in out of doors in ordinary soil. The cuttings were planted out from storage in the following May, and records of field stands compiled in Sept. Average survival for (*a*) to (*e*) were 42, 36, 35, 35 and 30% respectively. Treatment (*a*) (150 g./gal.) was evidently beneficial to rooting, and (*e*) (25 g./gal.) caused a significant decrease. Average survivals for (1) to (5) were 13·2 40·4, 15·5, 33·7, and 75·9% respectively, i.e. outdoor storage was vastly superior.

1713. VERHOVCEV, E. P. Intensivnost' dyh anija semjan listvennicy sibirskoj i značenie êtogo javlenija dlja praktiki lesosemennogo dela. **[The respiration rate of Siberian Larch seed and its practical significance.]** *Trudy Sibirskogo Lesotehničeskogo Instituta* No. 14, 1956 (73–81). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (4), (No. 15393). [Russ.] H.S.B.

The respiration rate of seeds of the current year's crop from the Khakassk Autonomous Region (Krasnoyarsk) was determined at (*a*) 7·14, (*b*) 17·89 and (*c*) 24% moisture content and in the range 5–55° C., by 5° intervals. For (*a*) the temperature maximum was 50°, for (*b*) 45° and for (*c*) 40°; raising the temperature above this critical level reduced germinative capacity and energy. In extracting Siberian Larch seed in a kiln, temperatures should be maintained at 35–40° for the first 4–5 hours, and then 45–50°.

232.314. Seed Purchase, Trade and Transport (including Seed Certification and Legislation for this Purpose)

See No. 1664.

232.315. Seed Storage and Treatment

See also Nos. 1568, 1703–5, 1746, 1758, 1992–3.

1714. SCHÖNBORN, A. Keimkrafterhaltende Aufbewahrung von Bucheckern. **[Storage of beechnuts so as to preserve their germinative capacity.]** *Allg. Forstzeitschr.* 13 (40), 1958 (576–7, 580). [G.g.]

Of 144 samples stored under various conditions for 9 or 15 months from Jan. 1957, those kept at − 4° C. in sealed plastic containers retained the highest mean germination % (61 against an original 82). No optimum moisture content for storage was found, but at − 16°, seeds with a m.c. > 15% were killed.

1715. JONES, E. W. **The storage of acorns in water.** *Forestry* 31 (2), 1958 (163–6). 3 refs.

Acorns of Sessile Oak (*Quercus petraea*) will not tolerate prolonged submergence, but those of Pedunculate Oak (*Q. robur*) survive very well in regularly changed distilled water or tap-water. Survival is considerably worse in basic river water; the difference from tap-water is likely to be due either to the greater activity of organisms promoting decay, or to the prevalence of lower oxygen tensions in river water. Storage in water under suitably controlled conditions might be a useful procedure

with Pedunculate acorns. [Cf. *F.A.* 19, pp. 458, 471.] *Author's summary.*

1716. EVREINOVA, T. N., and EROFEEV, N. G. Amilazy želudej hranivšihsja pri raznyh uslovijah. **[Amylases of acorns stored in different conditions.]** *Vestnik Moskovskogo Universiteta* (*Ser. Biol., Počvoved., Geol., Geogr.*) 1956 (2), (39–43). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (3), (No. 10388). [Russ.] H.S.B.

When *Quercus robur* acorns were stored unsealed, in damp sand at 0° C., amylase activity in the cotyledon (*a*) and other organs (*b*) increased in April, and germinative capacity was good. When stored in vessels with N_2 or CO_2, the activity of the enzyme increased in (*a*) and decreased in (*b*), with loss of germinative capacity. Acorns kept in a sieve in a cemented well at 5–10° retained normal germinative capacity and amylase activity in both (*a*) and (*b*). In a hermetically sealed vessel (500 c.c. air, 3 kg. seed), the enzyme activity in (*b*) and germinative energy increase. Acorn amylase was equally capable of hydrolysing acorn and potato starch.

1717. MESSER, H. Über die Behandlung des Forstsamens vor der Aussaat. **[Pretreatment of forest seed.]** *Forsttech. Inform., Mainz* 1958 (9), (65–70). 12 refs. [G.g.]

Discusses stratification methods, soaking and mechanical treatments for many species, particularly Hornbeam, Beech, Douglas Fir, *Pinus strobus*, and *Tilia cordata*. For the last named, some comparative data on the results of (*a*) immediate sowing of seeds harvested in late summer and early autumn, and spring sowing, after stratification, of seeds harvested (*b*) not fully ripe, or (*c*) ripe, are given, of which (*b*) was most successful.

1718. TASHIMA, Y., SAKO, S., and HIGO, K. **[Preliminary report on the effect of vernalization on the seedlings of *Pinus densiflora* and *Pinus luchuensis*.]** *Bulletin, Faculty of Agriculture, Kagoshima University* No. 4, 1955 (140–2). [Jap. jap.e.e.]

With both plants, vernalization promoted the development of adult leaves and main shoot growth.

1719. CJURUPA, B. N., and DEJANOVA, I. I. O nabuhanii semjan nekotoryh drevesno-kustarnikovyh porod. **[The swelling of seeds of some tree and shrub species.]** *Sbornik Trudov Botaničeskogo Sada Rostovskogo na/D. Universiteta* 35 (2), 1956 (103–8). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (3), (No. 10607). [Russ.] H.S.B.

The swelling of seed in water and moist sand at temperatures of 10° and 20° C. was studied, using *Gleditsia* [*triacanthos?*], *Acer tataricum, A. platanoides, Tilia cordata, T. platyphyllos, Fraxinus pennsylvanica, Thuja orientalis* and other species. For all species, water uptake was more rapid at 20° than at 10° in both media. The time taken by unstratified seed of various species to swell in water at 20° is shown, and the influence of temperature on swelling is tabulated for all the species.

1720. AGALOOS, B. C. **Insecticidal treatment of seeds against soil-borne insects.** *Philipp. J. For.* 11 (1/2), 1955 (1956), (57–66).

Seed of *Abroma augusta, Swietenia macrophylla, Sindora supa* and *Wallaceodendron celebicum* was treated with (*a*) 10% DDT, (*b*) 10% BHC, and (*c*) 10% methoxychlor, applied by (1) soaking for 3 hr. in a 10% aqueous suspension or (2) soaking for 3 hr. in tapwater and then shaking in a 10% dust. It was found that (1) gave better germination %s than (2), probably because of better residual protective effect. On average, (*c*) gave better protection than (*a*) or (*b*), which were of equal effectiveness. *Sindora supa* seedlings from (*b*)- and (*c*)-treated seed tended to be chlorotic, and the germination % from treated seed was little higher than that of controls. All treatments gave consideraly (2–3 times) higher germination %s of the other 3 species.

1721. FEDOTOVA, N. I. O zaraženii želudej mikorizoj pri poseve lesnyh polos. **[The infection of acorns with mycorrhiza for shelterbelt sowings [near Stavropol].]** *Bjulleten' Naučno-tehničeskoj Informacii Stavropol'skogo Naučno-Issledovatel'skogo Instituta Sel'skogo Hozjajstva* No. 1/2, 1956 (13–4) [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (3), (No. 10627). [Russ.] H.S.B.

Attempts were made to infect acorns with mycorrhiza (*a*) by mixing them with soil from Oak stands, (*b*) by infecting them with pure cultures of mycorrhizal fungi, and (*c*) by burying them in fresh horse dung. Best seedling growth was observed with methods (*a*) and (*b*). In their first year, mycorrhizal seedlings had a well developed root system penetrating to a depth of 1·25–2 in. Mycorrhiza was found on all the seedlings treated, though (*c*) gave no added growth.

232.318. Seed Testing. Germination Tests. Seed Quality

See also Nos. 1703, 1705, 1738.

1722. VINCENT, G. Zkoušky klíčivosti a životnosti u semen borových, modřínových a smrkových. **[Germination and viability tests on seeds of Pine, Larch and Spruce.]** *Práce výzkum. Úst. lesn. ČSR* No. 12, 1957 (133–90). 50 refs. [Cz.russ.f.]

Biochemical tests of viability for these 3 species have not so far proved reliable but, in view of their quickness, the author undertook a series of tests (300 seeds per test), comparing tetrazolium and indigo-carmine with results by germination. In Pine and Spruce, with seeds of good germinative capacity (80% or more), results by all 3 methods were in close accord. With Larch, even selected full seed gave discrepant results, e.g. by germination 85, tetrazolium 37, and indigo-carmine 75% and, in general, all biochemical tests gave lower figures. Soaking seed in water for several days brought the biochemical test figures almost up to those for germination, indicating that hydrogenases in the seed do not act until the seed has swelled sufficiently. Detailed results, including provenances, germinative energy, capacity, and purity % are tabulated. The author found that a short germination test (7-day for seeds of good germinative capacity, 10-day for others), followed by biochemical testing of the ungerminated remainder, gave more reliable results than the biochemical tests alone, besides revealing the germinative energy.

1723. HATANO, K. Über die Abhängigkeit der Atmungsintensität von Wassergehalt bei keimenden Kiefernsamen verschiedener Keimfähigkeit. [**The dependence of respiration rate on moisture content in germinating Scots Pine seeds of different germinative energy.**] *Forstwiss. Cbl.* 76 (11/12), 1957 (376–81). 5 refs. [G.g.]

The investigations were made on seeds with a germinative energy (g.e.) of (*a*) 99%, after 7 days; (*b*) 66%, 21 days; (*c*) 43%, 21 days. Virtually no difference in O consumption occurred in the first 24 hr., but after 48 hr. the lower the g.e. the more O consumption decreased. At a given moisture content, seeds of high g.e. respire more intensively than those of low g.e., but the correlation between respiration rate and g.e. is not so definite that viability can be determined exactly from the O consumption.

1724. GROSE, R. J., and ZIMMER, W. J. **Some laboratory germination responses of the seeds of River Red Gum, *Eucalyptus camaldulensis* Dehn. syn. *Eucalyptus rostrata* Schlecht.** *Repr.* from *Aust. J. Bot.* 6 (2), 1958 (129–53). 3 refs.

A method for sampling from bulked Eucalypt seed for germination tests, and a special technique for testing germination of these seeds in Petri dishes are described. The seeds of *E. camaldulensis* will germinate both at constant and at alternating temperatures. They germinate best at a constant temperature of about 95° F. The seeds require light for satisfactory germination. The light requirements of all seed-lots tested were satisfied by 8 hours of light daily at a constant temperature of 95°. Light requirements are least at temperatures close to 95°. There is an interaction between light and temperature, and the requirement for light is reduced as the temperature is increased. Stratification also reduces the requirement for light in germination. Thirty-one different lots of seeds have been studied. It has been shown that no relationship exists between environmental conditions of the locality of collection and optimum conditions for germination. *Authors' summary.*

232.32. Plant Rearing. Nursery Practice

1725. GRANT, O. **A note on nursery mechanization.** *Irish For.* 15 (1/2), 1958 (26–9).

Notes on the use of the Ledmore lining-out plough, a tractor rotavator, ridger, seed drill, grit distributor, inter-row cultivator, sprayer, and transport box, in use at the Forestry Division's nursery at Clonegal.

1726. TERENT'EVA, N. L., TOROPOGRICKIJ, D. P., and GORDON, F. JA. Agrotehnika vyraščivanija sejancev sosny v uslovijah Nižnedneprov'ja. [**The technique of raising Pine seedlings in the Lower Dnieper area.**] *Bjulleten' naučno-tehničeskoj Informacii, UkrNIILHA, Har'kov* No. 1, 1956 (19–22). [Russ.]

Discusses watering and fertilizing regimes for Pine nurseries in the area, where summers are long, hot and dry, with high soil temperatures.

1727. KANTOR, J., and VOLNÁ, M. Příspěvek k pěstování sadebního materiálu břízy. [**Raising Birch planting stock.**] *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (9), 1958 (781–800). 16 refs. [Cz.russ.g.]

Notes on nursery treatment of Birch, which is required in large quantities in Czechoslovakia as a pioneer species in afforestation schemes.

1728. DIAZ SERRANO, V. Las plantaciones de eucalipto de la Compañía Minas de Matahambre, S.A. en la Provincia de Pinar del Río, Cuba. [***Eucalyptus* plantations of the Matahambre Mining Co. in Pinar del Río, Cuba.**] *Carib. For.* 18 (3/4), 1957 (49–55). [Span.]

Describes a highly successful planting of > 600,000 Eucalypts, mainly *E. saligna*, from 1949, by the following procedure: Sowing 40 g./sq. m. of seed in 10-in.-deep fertilized beds of sand, left poor in humus to reduce damping off. Shade was gradually reduced from the time of germination. Open-ended cylinders, 8 × 15 cm., made from rectangles of 'Febreen 220' paper, 6 × 11 in. fastened by 3 clips, were used for pots. Ca. 33% of seedlings were discarded at 30–35 days old and the remainder were transplanted one to a pot, and shaded for a few days at the planting site. Pits were dug at 8 × 8 or 9 × 9 ft. spacing, on ground (*a*) with a coppice cut back to ground level, and (*b*) with woody growth eradicated by complete ploughing 25 cm. deep. Planting averaged 1000 plants/man-day. The area under (*a*) required 4 cleanings in the first year; that under (*b*)—the cheaper—none. Seedbeds were fertilized with 3/8/2/ NPK at 1 kg./ sq.m. and the pots and field plants with 5/7/8 NPK at 5 g. and 2 oz. respectively. Fertilizing reduced the period from sowing to completed planting from 114 to 94 days. Mining timber of 8 in. diam. was available in the 6th year.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 1549, 1554, 1924–7, 1993, 2447.

1729. HAGENZIEKER, F. **Fertilizing forest trees.** *World Crops* 10 (10), 1958 (369–72). 7 refs. O.R.E.

A review of Dutch work [e.g. *F.A.* 18 No. 1741; 19 No. 1657] on forest fertilizing, dealing mainly with coniferous species, and also with Poplars.

1730. OLEKSY, B. Gleboznawcze podstawy produkcji szkółkarskiej w karpackich terenach fliszowych. [**Soil science as a basis for nursery production on flysch sites in the Carpathians.**] *Sylwan* 102 (9), 1958 (31–48). 24 refs. [Pol.russ.e.]

The heavy acid shale soils of the region tend to crust over after rain, and have considerable quantities of Al and available K, but low contents of available P. Measures recommended for nurseries are: (1) liming (5–15 kg./are) in autumn on soils of pH < 5; (2) P fertilizing; (3) avoidance of K fertilizing; (4) N fertilizing in later years, when the nursery is established, or to improve old nurseries; (5) increasing the humus content, e.g. by composting. The need for more research is emphasized.

1731. SYVOROTKIN, G. S., DMITRIEVA, E. A., and GREHOVA, M. V. K voprosu primenenija udobrenij v lesopitomnikah. [**The use of fertilizers in forest nurseries.**] *Trudy Vsesojuznogo Naučno-Issledovatel'skogo Instituta Železno-Dorožnogo Transporta* No.

129, 1957 (172–82). [Russ.] From *abstr.* in *Referat. Ž. (Biol.)* 1958 (4), (No. 15395). [Russ.] H.S.B.

Mineral fertilizers (40 kg./ha. [each?] of N, P_2O_5 and K_2O) plus lime, improved the growth of *Acer negundo* seedlings considerably, and that of *Tilia cordata* and *Sorbus aucuparia* somewhat less. Liming alone adversely affected all 3 species, but when B compounds were added (2 kg.B/ha.) the adverse effect on Maple was relieved.

1732. GRIFFITH, A. L., and HOWLAND, P. **Fertilizers.** *Rep. E. Afr. Agric. For. Res. Organ. 1957*, 1958 (85–6).

Experiments already made at Muguga with *Pinus radiata* were repeated with *P. patula*, applying N, P, and K in all combinations and at two rates—(*a*) 8 g. N, 8g. P, 4g. K per box, (*b*) twice these quantities. The experiments confirmed the general indications previously obtained: (1) The response to fertilizers varies with the annual rainfall, being greater (30–33%) in a normal to wet year than in a dry one (10–15%). (2) There is very little difference in response between (*a*) and (*b*), and hence the latter is unnecessarily high. (3) The effect of application 12 weeks after pricking out is very small compared with application 6 weeks after pricking out. (4) The Pine seedlings gave the largest response to the N fertilizers and the smallest to the K, but the best plants were those given NPK. (5) All the experiments made over 6 years have shown that the application of a basic quantity of NPK is worth making. The quantity used is small, 3 oz./sq. yd. of bed or ½ oz./box, but it ensures that the basic nutrients are present.

1733. GRIFFITH, A. L., and HOWLAND, P. **Comparison of different Pine soils.** *Rep. E. Afr. Agric. For. Res. Organ. 1957*, 1958 (84–5).

Previous work has shown that under Muguga conditions the addition of Pine soil is not necessary in the nursery, and that a good balanced soil mixture produces better plants than boxes with a Pine soil inoculation. Further experiments with soils obtained from the top 3 in. below undecomposed litter of *Pinus patula* and *P. radiata* stands at Kinale and Kitiro indicate that these two species show no preference for their own soils (i.e. for possibly specific mycorrhizae).

1734. MOSER, M. Die künstliche Mykorrhizaimpfung an Forstpflanzen. [**Artificial inoculation of forest plants with mycorrhizae [Part I].**] *Forstwiss. Cbl.* 77 (1/2), 1958 (32–40). 22 refs. [G.g.]

Reviews earlier work on mycorrhizal cultures, and gives data on the media and methods used to obtain and maintain pure cultures in the present investigation. Lists also the several species of mycorrhizal fungi so far cultured, and the tree species with which they are normally associated.

1735. MOSER, M. Die künstliche Mykorrhizaimpfung von Forstpflanzen. II. Die Torfstreukultur von Mykorrhizapilzen. [**Artificial inoculation of forest plants with mycorrhizae. Part 2. The culture of mycorrhizal fungi in peat litter.**] *Forstwiss. Cbl.* 77 (9/10), 1958 (273–8). 10 refs. [G.g.]

Artificial inoculation of forest trees with mycorrhizal fungi cultured on a litter medium proved much better than the direct use of agar or liquid cultures. Ground peat with or without admixed Larch or Spruce needles is good, but it must be sterilized and requires the addition of a weak solution of glucose, P and N. Some varieties of mycorrhizal fungi also need lime, and others small quantities of the growth stimulators aneurin and biotin. *From author's summary.*

1736. HUTT, P. A. **Further notes on the Dunemann system.** *Quart. J. For.* 52 (4), 1958 (315–20 + 2 plates). 3 refs.

[Cf. *F.A.* 18 No. 1520.] Includes data on the bed boxes, shading, litter and sowing, watering, pests, and lifting.

232.323. Sowing and Covering

See also No. 1717.

1737. BELL, W. L. **Frost damage to Sitka Spruce seedbeds, Pubble Nursery.** *Forester, N. Ire.* 1 (4), 1958 (37–40).

In this nursery, where Sitka seedbeds suffer severely from both early and late frosts, it has been found that the degree of injury is closely related to density of sowing. Three lots of Sitka of different densities in one bed suffered as follows: 881 seedlings/yd. [of seed-bed?] no visible damage, 1564/yd. 50% damage, and 2550/yd. 80%.

1738. RUKAVINA, I. Género *Eucalyptus*. Cantidad de semillas a sembrar en almáciga por 1m². [**Eucalypts. Quantity of seed to be sown per sq. m. in the nursery.**] [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 223–200, 1957. pp. 4. [Span.]

Presents some preliminary results for 29 species. The number of variables involved do not permit a constant figure for any one species. Results of some germination tests on the same 29 species are also included.

232.324. Transplanting and Lining Out, including Grading of Seedlings

See also No. 1762.

1739. NAUDET, H. Mécanisation du repiquage des plants forestiers. [**Mechanization of transplanting in forest nurseries.**] *Rev. for. franç.* 10 (11), 1958 (718–21). [F.]

Describes (with photographs) a tractor-drawn frame of 7 planting units, whereby 7 men can plant 7 rows, 26 cm. apart at a rate of 30–50 plants per minute per man.

232.325. Tending (in both Seedbeds and Transplant Beds)

1740. KERR, C. H. **Nursery weed control.** *Forester, N. Ire.* 1 (3), 1958 (22–4).

Sorrel [? *Rumex acetosa*] in nursery beds was 90% eliminated by treating each individual clump with one or two drops of Tractor Vaporizing Oil (T.V.O.) squirted out of a small oil can, leaving the seedlings untouched by the T.V.O. Time taken was about the same as for hand weeding and results were better. Spraying with T.V.O. was not satisfactory—

the sorrel was not seriously damaged and the seedlings suffered from the spray.

1741. ZWEEP, W. VAN DER, and GRAAF, A. J. VAN DER. Het onkruidbestrijdingsonderzoek in boomkwekerijgewassen in Nederland. **[Weed control studies in nurseries in the Netherlands.]** *Mededelingen van de Landbouwhogeschool en de Opzoekingsstations van de Staat te Gent* 22 (3), 1957 (626–31). [Du.e.g.] (*Negende Jaarlijks Symposium over Phytopharmacie, Gent 1957*). O.R.E.

Preliminary results of research begun in 1954 include the following: (1) Autumn applications of DNC + IPC or CIPC at rates of 4, 3·5 and 2·0 kg./ha. respectively, can be made in deciduous nurseries and in *Buxus*, *Hedera*, *Thuja occidentalis*, *Taxus* and *Chamaecyparis* without damage; the golden forms of *Chamaecyparis* are more susceptible than the green ones, and *Pseudotsuga* is very susceptible. (3) EH_1 [SES] used to control certain weeds, e.g. *Chenopodium* spp. and *Gnaphalium uliginosum*, germinating in spring, gave good results with some tree species but at 3·5 kg./ha. caused damage to 2- to 3-year Alder. (3) Oils of the Shell AD type caused contact damage to green parts of plants and they are too expensive for ordinary use. (4) The DNC/IPC mixture can also be used as a pre- or post-planting treatment for leafless cuttings. (5) PCP as a pre-emergence spray gave promising results at 30–40 litres of 10% active principle/ha. on seedbeds of *Pseudotsuga*, *Pinus* spp., *Acer campestre*, *Sorbus aucuparia*, and *Prunus* spp., DNC with *A. campestre*, *S. aucuparia* and *Prunus serotina*, and PCP (30 litres of 10% active principle/ha.) + CIPC (2 kg./ha.) with *Pseudotsuga*, *Prunus serotina*, *A. campestre*, *S. aucuparia* and *Amelanchier*. (6) *Pinus sylvestris* and *P. nigra* vars. *corsicana* and *austriaca*, were undamaged by light aromatic oils at 750 litres/ha. only if sprayed before the seed-coat was shed by the germinating seedling.

1742. ALDHOUS, J. R. **Experiments in forest nurseries with some recently developed weedkillers.** *Proc. 3rd. Brit. Weed Control Conf.* 1956 (705–11). 2 refs. O.R.E.

Describes the results of experiments testing MCPB (2-methyl-4-chlorophenoxybutyric acid), 2,4-DB (2,4-dichlorophenoxybutyric acid), CDAA (2-chloro-N, N-diallylacetamide), CDEC (2-chloroallyl-diethyl-dithiocarbamate), and PCP, as seedbed weedkillers in forest nurseries. 2,4-DB and MCPB, applied as post-emergence sprays, seriously damaged conifer seedlings. Pre-sowing sprays of CDAA (4 lb./acre active ingredient) did little damage to the crop and gave good weed control. Pre- and post-emergence applications of CDAA were less successful than pre-emergence treatment with vaporizing oil. No treatment with CDEC controlled weeds as well as vaporizing oil. CDAA was more phytotoxic than CDEC. PCP was entirely unsuitable, since effective dosages substantially reduced the yield of conifer seedlings.

1743. MALCOLM, D. J., EVERETT, C. F., and MCGILLIVRAY, H. G. **Preplanting, pre-emergence and post-emergence treatments for weed control in conifer seedling beds and liners.** *Res. Rep. East. Sect. nat. Weed Comm. Can.* 1957 (60–3). O.R.E.

(1) Pre-planting treatments with $CaCN_2$ at 880 and 1760 lb./acre, dinoseb amine at 7·2 and 14·4 lb./acre, SES at 3 and 6 lb./acre, and Na N-methyl dithiocarbamate (Vapam) at 0·9 and 1·8 lb./acre, killed Black (B), Red (R) and White (W) Spruce and reduced Balsam Fir by 50%. (2) In early pre-emergence (residual) treatments, ethyl N, N-di-*n*-propylthiolcarbamate (EPTC) at 5 lb./acre in 50 gal. water/acre retarded B. Spruce and Balsam and killed 75% of R. and W. Spruce, while 10 lb./acre killed all Spruces and 80% of the Balsam. Dymor (IPC and CIPC granular) at 1·2 lb./acre killed all R. Spruce, 90% of W. Spruce, 30% of Balsam and severely stunted B. Spruce; at 2·4 lb./acre it killed all R. and B. Spruce, 90% of W. Spruce and 50% of Balsam. Vapam at 392 and 784·1 lb./acre killed all conifers. (3) In late pre-emergence (contact) treatments 2-chloro-4,6-bis(ethylamino)-S-triazine (Simazin) at 3 lb./acre killed 50% of Balsam, 90% of W. and B. Spruce and all the R. Spruce, while at 6 lb./acre it killed 50% of the Balsam and all Spruces. Alanap granular (N-1-naphthyl phthalamic acid-NP sodium) at 4·8 lb./acre killed 10% of Balsam, 25% of the B. and W. Spruces and 50% of R. Spruce and retarded the development of the rest. Diuron at both 0·75 and 1·5 lb./acre killed all conifers and weeds. Dinoseb amine at 3·6 lb./acre killed 50% of Balsam and all Spruces, and at 7·2 lb./acre killed 75% of the Balsam and retarded the other 25%. 2,4-D amine at 2 lb./acre killed 50% Balsam, 60% of W. Spruce and all R. and B. Spruce, and all surviving conifers were stunted; at 4 lb./acre Balsam and W. Spruce were 90% killed and the survivors stunted, while the B. and R. Spruces were all killed. KCNO at 13·5 or 27 lb./acre neither injured the conifer seedlings, nor controlled purslane and chickweed. (4) In post-emergence treatments herbicides were applied when the conifers were 1·0 to 1·5 in. high. 2,4-D amine at 1 lb./acre deformed or yellowed all Norway Spruce. SES at 3 lb./acre left most seedling conifers healthy though a few had brown tips, but did not control bluegrass, chickweed, corn spurry or pineapple weed. Dinoseb amine at 5 lb./acre killed all Spruce and weeds. Dalapon at 5 lb./acre killed all Spruce but did not control certain weed species. Varsol at 50 gal./acre (undiluted) killed 50% of the Spruce seedlings and yellowed most of the others. Dymor at 1·2 lb./acre slightly retarded the Spruce but did not control a variety of weeds. Alanap granular at 4 lb./acre left the seedlings comparing favourably with the control, but did not control bluegrass, chickweed, pineapple weed, shepherd's purse or *Digitaria* sp. In experimental sprayings of 3-year-old trees up to 8 in. high, set in rows (i.e. liners) it was found that diuron at 0·75 lb./acre caused browning of European Larch and death of Balsam with no damage to W. Spruce or Scots Pine; it did not control grasses. 2,4-D amine at 2 lb./acre caused moderate injury to Larch, Spruce and Balsam, with a slight curling of needles in Pine. SES at 3 lb./acre caused no damage and controlled no weeds. Dalapon at 5 lb./acre defoliated the Larch and killed Pine, W. Spruce and Balsam, without giving any measurable weed control. Dinoseb amine at 7· lb./acre killed all trees and

weeds. A mixture of dalapon and dinoseb amine at 5 and 3 lb./acre respectively, caused severe injury to all trees and weeds. Dymor at 1·2 lb./acre and Alanap granular at 4 lb./acre caused no noticeable damage to trees or weeds. Varsol at 50 gal./acre (undiluted) damaged neither trees nor weeds.

1744. TICKNOR, R. L., and BOBULA, P. F. **Tolerance of *Taxus* and *Juniperus* to selected herbicides.** *Proc. 12th Ntheast. Weed Control Conf.* 1958, (112–3). O.R.E.

Three-year-old plants of *Taxus media hicksi, T. baccata dovastoni* and *Juniperus chinensis pfitzeriana* were treated with the following herbicides at above-normal rates: CDAA (40 lb./acre), CDEC (40 lb./acre), EPTC (ethyl-N, N-di-*n*-propylthiolcarbamate) (5, 10 and 15 lb./acre), and simazin (4, 6, 8 and 10 lb./acre), in order to test their tolerance. Plots were treated in May and some of the EPTC plots re-treated in June because of purslane infestation. All plots were retreated in September. In the current season no evidence of injury was observed.

1745. TICKNOR, R. L., and BOBULA, P. F. **Rhododendron weed control by chemicals.** *Quarterly Bulletin of the Rhododendron Society* 11 (3), 1957 (161–3). From *abstr.* in *Weed Abstr.* 7 (10), 1958 (1623). O.R.E.

NPA at 16 lb./acre, NPA at 3 + 2,4-DES at 3 lb./acre, 2,4,-DES at 10 lb./acre, monuron at 0·5 and 1 lb./acre, diuron at 0·5 and 1 lb./acre, and CIPC at 4 and 6 lb./acre were applied as directed sprays in June and August to weed-free soil in which were growing hybrid seedlings of *Rhododendron catawbiense*. Monuron and diuron gave over 80% weed control, late applications at the higher rates giving complete control. CIPC gave good control except of *Lamium amplexicaule*. NPA and 2,4-DES were inconsistent, being most effective in cool weather with adequate soil moisture. Monuron caused chlorosis of new growth of 2-year-old *Ilex crenata convexa* but did not affect 2-year-old *Taxus cuspidata, Juniperus chinensis pfitzeriana* or *Cotoneaster divaricata*. Future applications of herbicides in granular form are suggested to avoid plant damage.

232.327. Protection Measures in Nurseries

See Nos. 1720, 1991–5.

1746. ABBOTT, H. G. **Application of avian repellents to Eastern White Pine seed.** *J. Wildlife Mgmt.* 22 (3), 1958 (304–6). 4 refs. B.A.P.

Nursery tests and feeding tests were made with *Pinus strobus* seed treated with 4 different repellents —anthraquinone, Morkit, quinizarine and Arasan Seed Disinfectant and Protectant (50% thiram). All proved effective in the nursery, particularly against grackles (*Quiscalus quiscula*). Feeding tests gave less positive results. Some species, particularly chipping sparrows (*Spizella passerina*) and house sparrows (*Passer domesticus*) eventually fed as freely on treated as untreated seed.

232.328. Vegetative Propagation

See also Nos. 1454–6, 1573, 1712.

1747. JOHANSEN, R. W., and KRAUS, J. F. **Propagation techniques applicable to Longleaf Pine.** *J. For.* 56 (9), 1958 (664). 5 refs.

Brief notes citing instances of successful propagation by cuttings, grafting and air-layering.

1748. SUSZKA, B. Wegetatywne rozmnażanie topoli z sekcji *Leuce* Duby. [**Vegetative propagation of *Populus* Section *Leuce*.**] *Sylwan* 102 (3), 1958 (66–77). 22 refs. [Pol.]

A review of literature, mostly German.

1749. WELLS, J. S. **Modern methods in the propagation of Hollies.** *Amer. Nurserym.* 108 (7), 1958 (58–63).

Discusses the propagation of *Ilex* spp. by cuttings, time of propagation, use of growth regulators, choice of rooting medium, use of mist etc.

1750. DAVID, R., and ANGELL, J. Étude histologique de la rhizogénèse dans le bouturage de *Pinus pinaster* Sol. [**Histological study of root formation in propagating *P. pinaster* by layering.**] *C.R. Soc. Biol., Paris.* 151 (7), 1957 (1958), (1390–2). 5 refs. [F.f.] O.R.S.

The progress of cicatrization and of root formation above the wound produced by removing a ring of bark [cf. *F.A.* 15 No. 1300] is described and illustrated by photomicrographs.

1751. FADEEVA, V. D., and LYLOV, G. I. Opyt razvedenija leščiny vegetativnym putem. [**An experiment on the vegetative propagation of Hazel.**] *Lesn. Hoz.* 11 (3), 1958 (82–3). 1 ref. [Russ.]

One-year-old coppice shoots of *Corylus avellana* strangulated with wire and then earthed up to a height of 30 cm. in late June, had all rooted well by the autumn of the following year.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

1752. KNIGHT, H. A. W. **Gibberellic acid application to Engelmann Spruce seedlings.** *For. Res. Rev. B.C. For. Serv. 1957/58*, 1958 (34–5).

In an attempt to stimulate seedling growth, so that 2 + 0 Spruce could be used as planting stock instead of 2 + 1 or 2 + 2, monthly spraying with gibberellic acid was done from May to August on 1 + 0 Engelmann Spruce. Ca. 25 c.c. of 'Gibrel'-water solution were applied to each 4 × 4 ft. plot at concentrations of 10, 100, and 1000 p.p.m. No significant root or top growth resulted from any concentration. Future work should include a lowering of the concentration and more frequent application.

1753. KNIGHT, H. A. W. **Gibberellic acid application to Western Hemlock seedlings.** *For. Res. Rev. B.C. For. Serv. 1957/58*, 1958 (36–7).

First-year seedlings of *Tsuga heterophylla* were sprayed in July and August with gibberellic-acid solutions [dosages and concentrations as in experiments on Engelmann Spruce—see preceding abstract]. No increase in top or root growth was observed from any treatment; but it was noticed that a Willow growing on one of the 1000-p.p.m. plots was 2–3 times larger than the same species outside the plots, 3–4 weeks after the first application.

1754. GIORDANO, E. La acción del ácido giberélico sobre plantitas de *Eucalyptus camaldulensis*

Dehn. **[The action of gibberellic acid on young plants of *E. rostrata*.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 303–200, 1957. pp. 7 + 2 plates. 23 refs. [Span.]

Young *E. rostrata* plants were sprayed 4 times at 24-hour intervals with gibberellic acid at 7 different concentrations, ranging from 5 to 200 p.p.m. A total of 1050 plants received treatment. On the 11th day after the first treatment, plants sprayed with concentrations of 50, 100 and 200 p.p.m. had almost doubled their initial height, but those treated with the highest concentration showed slight signs of chlorosis.

232.33. Formation of Stands by Direct Sowing

See also Nos. 1634, 1700, 1721, 2061.

1755. MANN, W. F., JR. **Guides for direct seeding the Southern Pines.** *Forests & People, Alexandria, La.* 8 (3), 1958 (16–7, 44, 47–8, 51–2).

Gives directions on seedbed preparation, time and rate of sowing, seed treatment, protection, costs etc., with main reference to *Pinus taeda* and *P. elliottii*.

1756. HANSBROUGH, T., and MERRIFIELD, R. G. **Direct seeding Loblolly Pine in North Louisiana.** *Hill Farm Facts, North Louisiana Hill Farm Experiment Station, Homer, Forestry* No. 1, 1958. pp. 4.

Results after 2 years of experiments begun in 1955, show that direct sowing of seed, treated with bird repellent, at 1½ lb./acre on abandoned fields will give adequate stocking. Season of sowing (unstratified seed in December, seed stratified for 60 days in February) had little effect on germination, but germination and survival from broadcast sowing on a disked seedbed was considerably better (1928 seedlings/acre after 2 years, December-sown seed) than on one where the vegetation was burnt (152/acre) or with no seedbed preparation (84/acre); mulching after sowing tended to increase germination, but mortality was also high (752/acre). The second-year survival of 1928 seedlings/acre represents roughly twice the number of plants remaining on plots planted at 6 × 6-ft. spacing, the comparative costs for sowing and planting being $6.50 and $10.00/acre.

1757. CLARK, M. B. **Exploratory direct seeding studies, Kamloops Forest District.** *For. Res. Rev. B.C. For. Serv. 1957/58*, 1958 (38–9).

Pilot studies in direct sowing, carried out in 1956 with stratified seed of (*a*) Douglas Fir, (*b*) Ponderosa Pine and (*c*) Engelmann Spruce, yielded the following conclusions: (1) The main problem in securing a successful direct sowing of (*a*) or (*b*) is one of rodent control, unless seed is sown in early spring; (2) autumn sowing is as good as spring sowing for (*c*), and rodent control is not necessary for this species, (3) the exact time of spring sowing is immaterial provided it is not later than 3–4 weeks after snow melt; (4) success with all species depends largely on moisture and temperature during and immediately after germination.

1758. DICK, J., *et al.* **Treatment of Douglas Fir seed to reduce loss to rodents.** *J. For.* 56 (9), 1958 (660–1). 2 refs.

Reports the statistically treated results of a direct broadcast sowing of Douglas Fir at 1 lb./acre with endrin-coated seed. The addition of a fungicide to the endrin coating proved unnecessary, and Dow Latex 512-R was found to be better than methocelrhoplex as a binder. First-season stocking (2610 seedlings/acre) indicated satisfactory rodent control.

1759. KOLEHMAINEN, V. A. **Skarsådd. [Sowing on the snowcrust.]** *Skogen* 45 (18), 1958 (537–8, 541). [Sw.]

Sowing broadcast on the snowcrust, preferably on a still sunny day, has been carried out at Domarnäs on 3229 ha. out of the total of 5256 ha. sown or planted with Pine, Spruce, exotics and figured Birch in the period 1904–57. Results from sample plots are tabulated and discussed. On burnt-over areas < 5 ha. in extent, 1·5 kg. Pine or Spruce seed per ha. is needed and on larger areas 2 kg./ha., but less seed can be used if the soil surface has been loosened. Spruce should be sown 1–2 years after burning, to allow the germination of Birch, which will later give protection against frost. Plant distribution is generally even; the seed, however, germinates at different times and 5 years must elapse before the success of the sowing can be determined.

1760. VALENTINI, J. A. Reforestación con especies de género eucalipto por el método de siembra directa en la provincia del Chaco—zona oriental húmeda. **[Afforestation with Eucalypts by direct sowing in the province of El Chaco—eastern humid zone.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 211–200, 1957. pp. 3. [Span.]

Preliminary experiments in direct sowing of *Eucalyptus rostrata* and *E. citriodora* in this region have given promising results.

1761. SCHMITZ, A., and DELVAUX, J. Implantation d'*Eucalyptus* sur brûlis. **[Direct sowings of Eucalypts on burned patches.]** *Bull. agric. Congo belge* 49 (4), 1958 (1003–15). 2 refs. [F.du.]

[Cf. *F.A.* 18 Nos. 399, 4029.] The success of direct sowings, the resistance of useful Eucalypts to early burning, and their freedom from termites in these patches, are described, with recommendations, based on recent early successes, for applications in: re-stocking: (*a*) fuel and (*b*) charcoal-kiln coupes, (*c*) the conversion of natural stands (all in dry forest); and (*d*) timber concessions in dense forest. For (*c*), carrying ± 150 steres/ha., 200 burned patches/ha., spaced at 7-m. centres, enough for final stocking, are possible. In (*a*) areas, 16–39 patches can be enriched and in (*b*), if kilns are limited to 20 steres, 7–15 kiln patches plus 15–20 others. Intervening spaces can be planted (4-months-old seedlings or stumps) on patches formed by burning sods. For early burning, fire is set from patch boundaries. Patches should be of 8–10 sq. m., the fire being hot enough to destroy subterranean vegetation. Burning should be done after some rain has fallen so as to leave some charcoal to anchor the ashes. The patch should be lightly hoed to mix in some soil, and levelled. Sowing should be done at the regular onset of the rains at a rate of 0·7–1 g. of small seed or 1–1·5 g. of large (*E. citriodora* and *E.*

maculata). These two species suffer more from the first dry season than *E. saligna*, *E. rostrata*, *E. umbellata*, *E. paniculata* and *E. sideroxylon* (stated in decreasing order of height growth). *Cassia siamea* and *Gmelina arborea* show promise. Cypresses and *Callitris* are too sensitive to early burning. For (*d*), direct sowings of *Chlorophora* and *Khaya* are to be tried and Pines (direct-sown or 4-month seedlings) on the other sites.

232.4. Formation of Stands by Planting

See also No. 1728.

232.41. Planting Stock (Type, Handling and Treatment)

See also Nos. 1712, 2099.

1762. SZYMAŃSKI, S. Objawy regeneracji u siewek sosny pospolitej. (*Pinus silvestris* L.). **[Observations on young *P. sylvestris*.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (413–20). 11 refs. [Pol.russ.g.]

In sorting 1-year seedlings, it was found that 1·6% had prematurely developed adult needles on short shoots. Analysis showed 72·5% of these seedlings to be abnormal, damaged or sickly, which led to the needle development being regarded as of a regenerative nature. The appearance of short shoots on 1-year seedlings may be taken to indicate their defectiveness, and such seedlings should not be used for planting stock.

1763. LYLE, E. S., JR., GILMORE, A. R., and MAY, J. T. **Survival and growth of 2–0 Longleaf and Loblolly seedlings in the field.** *Tree Plant. Notes* No. 33, 1958 (26–8).

Comparative plantings of 2 + 0 and 1 + 0 stock of both species showed that in general 2 + 0 gave poorer survival but slightly better height growth. Root pruning had no significant effect on height growth.

1764. TIRÉN, L. Om försök med plantering av tall och gran i Norrland. **[The planting of Pine and Spruce in Norrland.]** *Medd. SkogsforsknInst., Stockh.* 47 (5), 1958. pp. 99. 33 refs. [Sw.sw.e.*e*.]

Investigates the effect of a number of variables on survival %, height growth and regeneration costs, based on 71 trial plots [cf. *F.A.* 14 No. 1166]. Ten planting methods, some elaborate, were tried. The following chief conclusions emerged: The success of planting very largely depends on the skill and training of the man supervising the work, but even for the best of these the % of satisfactory plots likely to have 2000 out of 3000 plants surviving after 10 years, was surprisingly low. Generally 2 + 0 seedlings survived better than 3 + 0 seedlings, and Spruce slightly better than Pine. No significant differences attached to altitude (< 500 m.), vegetation type, burning or not, and time of planting (May 15–July 15), but height growth after 3 years was somewhat greater on burned sites, or sites with a herb rather than a brush ground cover, and in open holes. Planting was fastest with simple methods, e.g. slant planting, but as survival was lower, cost of establishment rose. If, however, the fastest methods of planting were done well, and under the most favourable conditions, i.e. after tractor clearing, they remained cheaper. Direct sowing, however, on comparable sites proved much more successful, more foolproof, and in most cases cheaper in relation to results.

232.42. Methods of Planting (including Use of Fertilizers etc.)

See also Nos. 1764, 1787, 1851.

1765. ROTTY, R. **Three rocks—for better planting survival.** *Tree Plant. Notes* No. 33, 1958 (3–5).

A note on the placing of 3 stones as close as possible to a newly planted tree, generally practised by Spanish labourers when planting Pines. Survival of 80–90% is achieved despite a mean annual precipitation of only 12–16 in. and long dry summers. The stones conserve moisture, reflect heat, protect the tree from weed growth and total destruction by browsing, and may prevent frost heaving. They also serve to mark the spot at which a tree was planted, and so simplify the investigation of survival.

1766. ROTTY, R. **Better survival with oversize hole digging.** *Tree Plant. Notes* No. 33, 1958 (6–11).

Describes a practice that probably accounts in large measure for the excellent survival in the plantations of Spain, namely the digging of a planting hole several times larger and deeper than required to accommodate the tree itself. At some convenient time after the close of the planting season, a gang with mattocks digs holes for the trees to be planted in the following spring. These are cubes of 12–16 in. and are checked by a foreman carrying a wire cube of the required size. Another gang follows and fills the holes, discarding the larger stones. Either during this filling, or during the planting operation itself, a *casilla* or basin, ⩾ 39 in. in diam. and ca. 6 in. deep, is dug round, but 6–8 in. off centre from, the hole. On sloping sites the workmen dig into the hill and build up the downhill edge to form the *casilla* that will trap and hold water. Such *casillas* with their deeply dug holes will intercept, and hold until absorbed, all but the most torrential downpours, and because they are off centre from the planting hole, the tree will not be flooded. When the trees are planted, their roots encounter a loosened and moistened zone into which they can quickly spread and by the time the drought begins they are well established, with deep roots, and nearly all survive the fierce rainless summer. The U.S. Forest Service has built a machine (illustrated), now undergoing field tests, for digging such holes and *casillas*. It consists of a large-diameter rotatable bit hanging from a powered post-hole digger carried on arms behind a tractor. It breaks up a deep area without removing much soil from the hole. The hole prepared by the machine has at the top a circle, 36 in. in diam., within which all the brush, herbaceous vegetation and roots are chopped up, and the soil is thoroughly ploughed by a rotating blade and disks. Beneath this scarified area is a second hole 9 in. deep and 9 in. in diam., and beneath this another one tapering to a point in ca. 9 in. Working drawings and specifications for construction of the machine are obtainable from the Equipment Development Center, U.S. Forest Service, Arcadia, Calif.

1767. Fox, G. F. **Modifications of a Lowther tree planter for better quality planting and survival.** *Tree Plant. Notes* No. 33, 1958 (15–7).

Describes, with illustrations, the addition of a set of scalper ploughs to a standard Lowther tree planter. This has increased survival and growth of planted Pine seedlings in Louisiana during the past 3 planting seasons.

1768. Stiell, W. M. **A spacing aid for machine planting.** *Tree Plant. Notes* No. 33, 1958 (18–9).

Describes, with photograph and scale drawings, a mechanism devised at Petawawa [Ont.] to ensure exact spacing of trees within rows. It includes a solid wooden wheel whose circumference equals the desired spacing distance. With every revolution of the wheel, a steel peg fixed to its side trips a spring-loaded striker which rings a bell. The whole assembly is fixed to the planting machine by a sleeve attachment and trailed behind it.

232.43. Spacing and Arrangement in Plantations

See also Nos. 1768, 2203.

1769. Eberhart, Z. Příspěvek ke studiu hnízdové sadby. [**A contribution to the study of 'nest' planting.**] *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (5), 1958 (357–74). 13 refs. [Cz.cz.russ.e.]

Briefly reviews Lysenko's theories as to the non-existence of intra-specific competition, agreeing with other authors, e.g. V. N. Sukačev and K. M. Zavadskij, that this notion can be dismissed, but stressing the need to settle the question whether nest planting may nevertheless have practical advantages. Defines 'nest' as an artificially created group (normally 1 sq. m.) composed of individuals of the same species, but subject to natural differentiation, its density corresponding to that of natural regeneration, and formed with the object of producing a single high-quality tree. Gives details of measurements (height increment, crown breadth, root formation) carried out to determine the possible practical advantages of the 'nest' method, and stresses the need to analyse measurements by frequency distribution and not arithmetic means for the whole nest. Three stages are distinguished: Stage I is characterized by (*a*) better height increment as compared with equally spaced seedlings; (*b*) better resistance to weed competition—the more so the more plants per nest; (*c*) natural selection operating right from the start and resulting in height differentiation, which (i) proceeds the faster the more plants per nest, (ii) is directly related to, and increases with, age. This first stage lasts from planting time until the plants begin to render their own environment unfavourable. Details are given of two experimental areas, one at Bílovice nad Svitavou, where 296 Pines, planted out both in nests (2 to 7 per nest) and at regular spacings, were 5 years old at the time of measurement; the other [Spruce?] at Soběšice. The experimental area pertaining to the second stage was located in the garden of the Brno Silvicultural Institute: 422 Pines were planted in nests (from 16 to 2 trees per nest) and 64 at regular spacing. At Stage II, (*a*) the competition *inter se* selects the fastest growing and most vigorous individuals; (*b*) with increasing age, differentiation in vigour and height growth becomes more pronounced, the latter the more so the more plants per nest; (*c*) the branches are finer than in Stage I, and the branches finer and the crown better than in plants at ordinary spacing; (*d*) tap-root development is superior; (*e*) stems have less taper. Stage III: no plots were available but the author postulates that this stage begins with one tree—the thriftiest—dominating the others, which help its self-pruning.

1770. Steedley, A. G. **Wide tree spacing versus medium spacing.** *Naval Stores Rev.* 68 (5), 1958 (7).

A comparison of timber and resin returns over a period of 21 years from two Slash Pine plantations spaced originally at (1) 12 × 12 and (2) 15 × 15 ft. show a greater financial yield from (1).

1771. Little, S., and Somes, H. A. **Results 18 years after planting Loblolly Pines at different spacings.** *For. Res. Note Ntheast. For. Exp. Sta.* No. 80, 1958. pp. 3. 2 refs.

Tests of spacings replicated on 4 plots of 100 sq. ft. on Maryland's Eastern Shore showed after 18 years that mean diameter was 4·5 in. in the 4-ft. spacing, 5·4 in. in the 5·7-ft., 6·6 in. in the 8-ft. and 7·7 in. in the 11·3-ft. spacing. Naturally regenerated seedlings, which became established roughly in inverse proportion to the density of planting, tended to equalize total densities. The spacing usually practised in Maryland (6 × 7 ft.) appears therefore to be satisfactory, but 8-ft. spacing is recommended where some natural regeneration can be expected.

1772. Brückmann, J. J., and Brückmann, H. H. El crecimiento de *Taxodium distichum* en la zona entrerriana del delta del Paraná. [**Growth of *T. distichum* in the Entre Rios region of the Paraná delta.**] *Rev. for. argent.* 2 (3), 1958 (92–7). [Span.]

Presents the results of measurements made on 4 different stands, of the following area, age and initial spacing: (1) 3415 sq. m., 11 years, 3 × 3 m., (2) 6750 sq. m., 11 years, 3 × 3 m., (3) 4000 sq. m. 14 years, 3 × 4 m., and (4) 300 sq. m., 19 years, 2 × 2 m. Calculations of annual increment show that in (1) growth took a normal course but in (2), at the same initial spacing, growth was slower at first and has only recently equalled that of (1). The best growth was obtained in (3). That of (4) was much the lowest.

1773. Alonso, J. El eucalipto en Santiago del Estero—su importancia y porvenir a través de trece años de observaciones. [**Eucalypts in Santiago del Estero—their importance and their future according to thirteen years' observation.**] [*Pap.*] *I^as Jorn. argent. Eucalipto Asoc. for. argent.* No. 229–200, 1957. pp. 6. [Span.]

Presents some preliminary results of experiments in spacing Eucalypts. Data are given on some plantations established in 1944, 1946 and 1949.

232.5. Artificial Formation of Stands by Vegetative Propagation

1774. Gjul'mamedov, R. G. Vyraščivanie nasaždenij bystrorastuščih porod na orošaemyh

zemljah Mil'skoj stepi putem posadki čerenkov. [**Growing stands of quick-growing species by direct planting of cuttings on irrigated land on the Mil'sk steppe.**] *Bjulleten' Naučno-Tehničeskoj Informacii Azerbajdžanskogo Naučno-Issledovatel'skogo Instituta Lesnogo Hozjajstva i Agrolesomelioracii* 1957 (1/2), (35–9). [Russ.] From *abstr. in Referat. Ž. (Biol.)* 1958 (4), (No. 15405). [Russ.] H.S.B.

Experiments at Zhdanovsk in 1951–53 showed that cuttings of 'Canadian' and hybrid Poplars, *Elaeagnus angustifolia* and *Punica granatum* taken in autumn calloused readily during storage and both roots and shoots developed rapidly after planting in spring. Cuttings 30 cm. long showed better survival and growth than those 20 cm. long. Vertical planting gave better results than oblique or horizontal planting in the Mil'sk steppe conditions.

1775. Moore, H. **Planting Cottonwood cuttings.** *Proc. 7th For. Symp. La. Sch. For.* 1958 (10–5). 17 refs.

Describes methods used in direct planting of Cottonwood [*Populus deltoides?*] cuttings, with details of costs and returns. Though cuttings can be taken from natural stands, it is more convenient to take them from nursery stock planted 1 ft. apart in rows 40 in. apart.

1776. Kriebel, H. B., Lowry, G. L., and Murphey, W. K. **Relationship of site conditions to establishment and early growth of McKee hybrid Poplar.** *Res. Circ. Ohio agric. Exp. Sta.* No. 53, 1958. pp. 11.

Tests were made with a single clone of the so-called 'McKee' hybrid (*Populus trichocarpa* × *P. angulata*), using unrooted cuttings (*a*) on upland soils in 1947 and 1949, (*b*) on bottomland sites in 1957, and (*c*) on spoil banks in 1952–53. Preliminary results indicate that best growth is obtained on a well drained silt-loam with moderate thinning. Height and diameter increment seem to be related to drainage conditions on normal soils; height at 5 years on these soils ranged from a mean of 8 ft. on very poorly drained soils to 28 ft. on well drained ones. Growth on (*a*) plots was considerably less in the second than in the first 5 years. In (*c*) fertilizer treatment was rather detrimental to survival, and good internal drainage was the most important condition for satisfactory height growth. Canker, as judged by (*a*) plots, begins at about the 5th year and affects all trees by the 10th, but many cankers healed over at an early age and the majority of trees maintained vigour and did not show serious stem decay during this stage of growth.

1777. Malacoco, E. **A study of the effect of site on the survival of *Broussonetia papyrifera* Vent (Paper Mulberry) on Mount Makiling.** *Philipp. J. For.* 12 (1/2), 1956 (1957), (93–100). 3 refs.

Root suckers proved to be better planting material than root, stem, or softwood cuttings. Adequate shade during the first few weeks is desirable. Suckers ≤ 1 m. high gave better survival than larger ones.

233. Afforestation

See also Nos. 1373–4, 1403, 1405–6.

1778. Fischer, P. Die Schwarzkiefer im Forstamt Zellingen. [**Austrian Pine in Zellingen district.**] *Allg. Forstzeitschr.* 13 (37), 1958 (524–7). [G.g.]

An illustrated account of successful extensive afforestation, mainly by sowing, of derelict, shallow and stony sites on a Lower Triassic shell-limestone plateau in Franconia, chiefly with *P. nigra* var. *austriaca*, around the turn of the century. Soil improvement and humus formation under the stands made underplanting with Beech and Oak possible when the Pines were ca. 30 years old, and self-sown hardwoods, as well as natural regeneration of Pine, abound.

1779. Wobst, W. Die Wiederaufforstung im Harz 1945 bis 1956. [**Reforestation in the Harz range [N.W. German part] 1945–46.**] *Allg. Forstzeitschr.* 13 (35), 1958 (485–7). [G.]

Of the 12,000 ha. (ca. 15% of the total forest area), some 10,000 ha. were replanted with pure Spruce, partly for reasons of site and availability of seed, but largely because of game difficulties. All other species, if planted unfenced, failed.

1780. Weck, J. Zur Wiederbewaldung 'Atlantischer Heiden' insbesondere in Nordwestdeutschland. [**The afforestation of 'Atlantic heaths', with special reference to N.W. Germany.**] *Allg. Forstzeitschr.* 13 (35), 1958 (481–5). [G.]

Discusses their climatic and ecological characters and makes recommendations on soil preparation, amelioration etc., and choice of species. In general, pioneer plantings of Pine (Scottish provenances for coastal regions), Norway and Sitka Spruce, and Japanese Larch with Birch, followed by mixtures of hardwoods and high-yielding exotics are advocated.

1781. Jagow, von. Ödlandaufforstung im Emsland. [**Afforestation of waste land in the Emsland.**] *Allg. Forstzeitschr.* 13 (35), 1958 (492–5, 497). [G.]

An illustrated account of soil preparation, including equipment, fertilizers, green manuring etc., and species used on ca. 10,000 ha. of derelict heath and scrub near the Dutch frontier, S.W. of Oldenburg. Pine and Japanese Larch, which proved particularly successful, were the main species.

1782. Moser, L. Valorizzazione forestale delle brughiere lombarde. [**Development of the Lombard *brughiere* for forestry.**] *Monti e Boschi* 9 (9), 1958 (487–500). [It.f.e.]

Describes the soil, vegetation etc. of these fluvioglacial terraces intersected with watercourses, which lie between the Adda and Ticino rivers. The soils are coarse, acid, deficient in nutrients, and unfitted for agriculture. Some experiments in planting are described. The natural vegetation is mixed Pine/hardwood scrub, bracken and *Calluna*.

1783. Traci, C. Cultura aninului alb (*Alnus incana* (L.) Mönch) pe terenurile degradate. [**Growing *A. incana* on degraded soils.**] *Rev. Pădurilor* 1958 (6), (344–7). 8 refs. [Rum.russ.g.f.e.]

Describes experiments in growing *A. incana* on eroded slopes, planted either in groups or in terraced rows. Tabulated data on survival %, height, diameter and vigour after 1 year [age at planting out not mentioned] are given for a number of sites

with various aspects, soils etc. The use of this species as a soil improver on degraded soils is recommended.

1784. HARITONOV, G. A. Oblesenie melovyh počv i obnaženij v central'nyh rajonah. [**Afforestation of chalk soils and bare chalk in the central parts [of the U.S.S.R.].**] *Lesn. Hoz.* 11 (1), 1958 (22–7). [Russ.]

On the basis of afforestation trials on (*a*) recently clear-felled areas, (*b*) semi-eroded soils, (*c*) highly eroded soils, and (*d*) steep, bare chalk slopes, recommends for (*a*) Oak and *Pinus sylvestris* (preferably var. *cretacea*), (*b*) *P. sylvestris*, *Betula verrucosa* and *Fraxinus pennsylvanica*, and (*c*) *F. pennsylvanica* and *Ulmus pumila* var. *arborea*. Some suggestions are made on trees and shrubs suitable as associates for these species. On (*d*), the establishment of protective forest strips at top and bottom of the slope, sowing of grass and herbs for bee pasture, fertilizer application, water-erosion control measures, and permanent or temporary closure to grazing are necessary, and 15–20 years will often be required before trees and shrubs recommended for (*c*) can be planted.

1785. SZÖNYI, L. Die Rolle der Exoten in der ungarischen Sandaufforstung. [**Exotics in the afforestation of sands in Hungary.**] *Arch. Forstw.* 7 (4/5), 1958 (276–301). [G.g.russ.e.]

A translation, with added illustrations, of the article abstracted at *F.A.* 19 No. 1703. Over 30 species are mentioned as suitable for the most inhospitable of the 6 Hungarian sand types.

1786. DRJUČENKO, M. M. Primenenie glubokogo ryhlenija počvy pri oblesenii Nižnedneprovskih peskov. [**The use of deep cultivation for afforestation of the sandy areas of the Lower Dnieper.**] *Bjulleten' naučno-tehničeskoj Informacii, UkrNIILHA, Har'kov* No. 1, 1956 (11–5). [Russ.]

Disking, mouldboard ploughing, and subsoiling benefited the survival, root and height growth, and plant weight, of Scots Pine seedlings. The beneficial effect increased with depth of cultivation from 30 to 150 cm.

1787. VINOGRADOV, V. N. O roli torfa pri sozdanii sosnovyh kul'tur na Nižnedneprovskih peskah. [**The role of peat in planting Pines on the Lower Dnieper sands.**] *Bjulleten' naučno-tehničeskoj Informacii, UkrNIILHA, Har'kov* No. 1, 1956 (15–9). [Russ.]

The 'peat-nest' method [cf. *F.A.* 19 No. 4144] of planting 9 one-year or 5 two-year Scots Pine seedlings per hole has given poor results, owing to the compaction and desiccation of the peat. The method is also very expensive. Other methods of afforesting these sandy areas are being studied.

1788. KOČERGA, F. K. Agrotehnika lesorazvedenija v gornyh rajonah Srednej Azii i Južnogo Kazahstana. [**Afforestation techniques in the mountainous regions of Central Asia and S. Kazakhstan.**] Sredneaziatskij Naučno-Issledovatel'skij Institut Lesnogo Hozjajstva, Tashkent. 1957. pp. 52. [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (4), (No. 15416). [Russ.] H.S.B.

Describes site conditions, methods of soil cultivation, planting and tending, with some information on pests and diseases and their control. Species for planting are recommended.

1789. FINN, R. F. **Ten years of strip-mine forestation research in Ohio.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 153, 1958. pp. 38. 13 refs.

[Cf. *F.A.* 12 No. 1108.] Discusses, with tables, survival and growth of different species, the most widely planted being *Robinia pseudoacacia*, in relation to site treatment, fertilizer application, planting methods, aspect, slope, soil toxicity (very low pH), grasses and legumes, and damage by pests. Disease is negligible. Limited trials were also made with cuttings of hybrid Poplar clones. Direct sowings gave poor results.

1790. THAKEKAR, K. N. **Afforestation works in Poona and Satara Divisions, Bombay State.** *Indian For.* 84 (10), 1958 (623–7 + 3 photos). 5 refs.

Describes planting on eroded slopes using *urali* (contour ridges) on moderate slopes, and staggered contour trenches on steep ones, with some indications of costs.

1791. KERMODE, C. W. D. **Dry zone afforestation.** *Burmese For.* 8 (1), 1958 (26–30).

Notes on a tour to observe the progress of afforestation in the Meiktila and Myingyan districts of Burma.

1792. HUNDLEY, H. G. **Interim report on dry zone experiments in Meiktila forest division.** *Burmese For.* 8 (1), 1958 (32–41).

Gives tabulated data from experimental plots, laid down 1954–56, to ascertain the most suitable species for afforestation of dry areas, the effect of different degrees of protection, and the best methods of planting, spacing etc. Preliminary results confirm the advantages of protection from grazing and indicate that the best method is fencing, with early burning of grass to reduce fire hazard. The tabulated data include survival and height growth at 1 and 2 years at different spacings for a number of indigenous species (including *Acacia catechu*, *Albizzia lebbek*, *Sterculia campanulata*, *Holoptelea integrifolia* and *Pterocarpus macrocarpus*), several Eucalypts (*E. citriodora*, *E. grandis*, *E. maculata*, and *E. rostrata*), and *Acacia decurrens* var. *mollissima*.

1793. VALENTINI, J. A. Reforestación con *Eucaliptus* en campos bajos en la provincia del Chaco—zona oriental húmeda. [**Reforestation with Eucalypts on low-lying land in El Chaco province—eastern humid zone.**] [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 212–200, 1957. pp. 3. [Span.]

Presents short notes on plantations established during 1949–53 in (1) land free of ant-hills, and (2) ravines with ant-hills.

235. Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth

1794. ZAKOPAL, V. Charakter půdního prokořenění křivoklátských holin zejména břízou.

[Root development on clear-felled areas near Křivoklát, with particular reference to Birch.] *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (9), 1958 (737–60). 13 refs. [Cz.russ.g.]

Observations were made on the root development of the vegetation on 4 large, clear-felled areas on gley-type podzols. On average, 85% by weight of the roots of *Calamagrostis epigeios* were in the top 10 cm. of soil and the other, less common, grasses showed the same trend [cf. *F.A.* 20 No. 1701]. Birch roots, however, penetrated deeply into the soils—70 cm. deep in 9 years, 110 cm. in 15, and 150 cm. in 30. The importance of roots < 1 mm. diam. in improving soil structure is emphasized, and their proportions were found to be 9–16% by weight, 95–97% by length, and 10–25% by volume, of the total roots. Root development of Birch compared very favourably with that of *Alnus glutinosa, Quercus robur*, Scots Pine, Larch and *Tilia* sp. Planting trials with several species had shown the impossibility of reforesting these sites directly, as plant survival was only 2·8% after ca. 15 years. The absolute necessity for Birch as a pioneer and nurse species on such sites is clear, and natural Birch seeding should be augmented artificially if necessary.

1795. SMIRNOV, V. N., PONOMAREV, JU. I., and SMIRNOVA, A. I. Vlijanie rakitnika na lesorastitel'nye svojstva pesčanyh podzolistyh počv. **[The influence of *Cytisus* on the properties of sandy podzolic soils concerned in forest growth.]** *Lesn. Hoz.* 11 (3), 1958 (81). [Russ.]

Tabulates soil-analytical data for a 26-year Pine/Birch stand in Mari A.S.S.R. (*a*) with and (*b*) without an underwood of *C. ratisbonensis*. The figures for (*a*) show markedly higher contents of organic matter, N and mineral nutrients.

1796. KING, J. E. **Development of a stand of coniferous reproduction and interplanted Douglas Fir.** *Northw. Sci.* 32 (1), 1958 (1–8). 3 refs. L.S.

In 1944 a poorly stocked natural stand of mixed 5- to 10-year-old conifers on ca. 400 acres was interplanted with Douglas Fir at 4- to 6-ft. spacing in Grays Harbor County, W. Washington. Two permanent one-acre sample plots were established in 1946. The interplantings changed the cover from bracken and brush with scattered reproduction to a predominantly coniferous one. Survival after 10 years was 45% for the planted Douglas and 87% for the natural crop (Douglas, Western Hemlock, Sitka Spruce). Two-thirds of the mortality was attributed to damage by wildlife, largely from mountain beaver. Deer and rabbit browsing were also frequent and girdling by bear killed 4 large natural Douglas per acre. Other losses were from mechanical injuries, competition and dieback. In many cases the interplanted trees had been suppressed, and for future interplanting a distance of 10 ft. from existing conifers ⩾ 8 ft. high is recommended. After 13 growing seasons, 70% of the undamaged and moderately damaged Douglas Fir had a d.b.h. of > 1·5 in., with mean heights of 18·2 and 16·2 ft. respectively. The natural conifers showed rapid diam. and height growth by 1956, varying according to species (d.b.h. up to 16 in. for Douglas, 13 in. for Hemlock and 7 in. for Spruce), and have also developed very wide crowns.

236. Care of Regeneration or Plantations in the Initial Stages of Establishment

See also Nos. 1796, 1956 *et seq.*, 2175, 2203.

1797. GONZALEZ-VAZQUEZ, E. Aplicación de los tratamientos a los montes mediterráneos—previa experimentación sobre sus regeneraciones. **[The management of Mediterranean forests—preliminary experiments on regeneration.]** *Montes, Madrid* 14 (82), 1958 (253–63). [Span.]

The author expounds a method of judging the progress of forest regeneration by the use of 4 criteria; (1) *Fr*—regenerative faculty, i.e. the % of plants surviving initial planting or sowing, or the number of coppice shoots, (2) *Er*—regenerative energy, which is a function of the rapidity of development of the regeneration and the growth vigour of the plants themselves, (3) *Dr*—density of the regeneration, and (4) *Vu*—utilizable value of the regeneration, a factor that needs to be based on past experience. Formulae are developed and are applied to the study of the development of two stands of *Pinus pinaster* and *Quercus suber* respectively, both established in 1912.

237. Amelioration of Forest Sites

See also Nos. 1379, 1386, 1553, 1729, 1795, 1932.

1798. GRAHAM, B. F., JR., and REBUCK, A. L. **The effect of drainage on the establishment and growth of Pond Pine (*Pinus serotina*).** *Ecology* 39 (1), 1958 (33–6). 14 refs.

Comparison was made of the woody vegetation that had developed on either side of a logging road, one side of which (*a*) was well drained as the result of a dragline canal, and the other (*b*) poorly drained. In terms of b.a. or of height, growth on (*a*) was nearly double that on (*b*). *P. serotina* was the dominant species on both sites, but it was absent from the seedling and transgressive strata on (*a*). [Cf. *F.A.* 20 No. 1546.]

1799. HOLSTENER-JØRGENSEN, H. Lidt om bøgedyrkningens fremtidsmuligheder bedømt på grundlag af udviklingen i Rude skov. **[Indications, from developments in Rude forest, of future possibilities for Beech.]** *Dansk Skovforen. Tidsskr.* 43 (8), 1958 (400–8). 8 refs. [Dan.]

Discusses two compartments, one of which was cultivated and the other cultivated and limed in the 1880's, both of which show a change from mor to mull and increased growth in the last 70–80 years. Possible reasons are suggested.

1800. HASSENKAMP, W. 30 Jahre Bodenverbesserungsversuche. **[30 years of soil-improvement experiments.]** *Forstarchiv* 29 (8), 1958 (179–84). [G.]

Discusses results of soil improvement measures, particularly in N.W. Germany, including the effect of liming on raw humus, and considers the growth of Oak, Beech, Spruce, Pine, Larch and other species on treated sites.

1801. MITSCHERLICH, G., and WITTICH, W. Düngungsversuche in älteren Beständen Badens.

1. Bericht. **[Fertilizer trials in middle-aged stands in Baden. 1st report.]** *Allg. Forst- u. Jagdztg.* 129 (8/9), 1958 (169–90). [G.g.e.]

Reports on 14 trial series on plateau sites of the High and Eastern Black Forest (800–1200 m. alt.) mostly in pure Spruce of 44 to 113 years, but also some Silver Fir and Pine. Various forms and dosages of liming (mostly as CaO) with or without added N (mostly as $NH_4NO_3 \cdot CaCO_3$) and/or P (as basic slag) were tested on 50 × 60-m. plots, on parts of which (40 × 50 m.) measurements of diameter and sample increment borings were made. The latter permitted comparisons of ring widths for the 10 years before and the 5 years after treatment in 1950 or 1951 (which in some cases was later repeated). In addition to data on fertilizer application and increment, results of soil and needle analyses are tabulated for most plots. Liming was beneficial on all sites except two with mull humus, but on one such site where the K/Ca ratio in the needles was high, growth was stimulated. Doubling the traditional Ca dose on raw-humus sites sometimes led to less increment than the single dose (of ca. 3000 kg. CaO/ha.) presumably because of autoxidation of lignin residues resulting in an increase in non-hydrolysable N. Growth reaction to N was good on all plots (8 series) where it was applied, which included a mull humus site with N content of 3%, suggesting that the traditional diagnostic level of 2·2% may need revision. Total fertilizer costs (including failures) were considerably less than the estimated values of volume increases. An analysis of increment by diameter classes suggested that there was not much difference between them.

1802. MITSCHERLICH, G., and WITTICH, W. Düngungsversuche in älteren Beständen Badens. **[Fertilizer trials in middle-aged stands in Baden. 1st report.]** *SchrReihe bad.-württemb. VersAnst.* No. 16, 1958. pp. [30]. 6 refs. [G.g.e.]

[Cf. preceding abstract.] The present paper is a reprint, with 8 pp. of additional enumeration data.

1803. ZÖTTL, H. Ein Vergleich zwischen Ammoniakgas- und Stickstoffsalzdüngung in Kiefern- und Fichtenbeständen Bayerns. **[A comparison between application of NH_3 gas and N salts in Pine and Spruce stands in Bavaria.]** *Forstwiss. Cbl.* 77 (1/2), 1958 (1–31). 38 refs. [G.g.]

Sample plots in Pine and Spruce stands were given various amounts of N per ha., either as salts or as NH_3 gas. Soil samples were taken at various intervals after treatment, and incubation experiments [see *F.A.* 19 No. 1721] and needle analyses made. Application of N salts gave a more uniform distribution than did NH_3 gas, and caused greater increases in the N contents of the needles. Ca and P application increased mineralization activity in the humus, which NH_3 gas further intensified, at least near the injection holes.

1804. NĚMEC, A. Meliorace degradované půdy hnojením kompostem, čedičem a surovým fosfátem v oblasti kridového piskovce. **[Amelioration of a degraded soil in the chalk-sandstone region by applying compost, basalt and crude phosphate.]** *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (8), 1958 (713–28). 4 refs. [Cz.russ.g.]

In clearings in pure forests in N.E. Bohemia, managed on the group system, *Alnus glutinosa*, *Acer pseudoplatanus*, *Tilia* sp., *Fagus sylvatica*, and *Quercus robur* were planted in 1954 and given various combinations and quantities of ground basalt, phosphate and compost. Height growth and survival were recorded from 1954 to 1957 and the fertilizer preferences of the various species deduced.

1805. KWASNITSCHKA, K. Fichtenwuchsstockungen auf dem Buntsandstein des südlichen Ostschwarzwaldes. **[Checked growth of Spruce on the bunter sandstone of the S.E. Schwarzwald.]** *Forstwiss. Cbl.* 76 (5/6), 1957 (133–59). 23 refs. [G.g.]

[Cf. *F.A.* 17 No. 3136.] Analyses were made of the course of height growth of Spruce (*a*) from a Spruce/Pine/Silver Fir stand, (*b*) from a checked Spruce stand, (*c*) from a checked Spruce/Pine stand, and (*d*) on 'stagnogley'. The reasons for checked growth of the Spruce are complex and not entirely understood, but appear to lie in the interaction of stand, soil, human activity (e.g. litter removal), and the tree species. In mixtures with sufficient Fir, no checked Spruce occurred. Silvicultural methods of relieving this condition by returning to natural mixtures are briefly discussed.

1806. DIEPOLD, F. Die Erde des Waldes. **[The soil of the forest.]** *Allg. Forstzeitschr.* 13 (41), 1958 (585–91). [G.]

Argues that only during a period of 'forest fallow' can herbs and shrubs break down raw humus and produce mild humus, and recommends promoting the growth of beneficial species such as *Epilobium angustifolium*, *Senecio viscosus*, *Digitalis purpurea*, *Sambucus*, *Sorbus* and others by scarifying the raw humus, fertilizing and sowing their seeds, but not liming or lupin growing.

1807. KOSTURKIEWICZ, A., and NOWIŃSKI, S. Badania wpływu nawadniania miejskimi wodami ściekowymi na wzrost drzewostanu sosnowego. **[Investigations on the influence of sewage irrigation on the growth of a Scots Pine stand.]** *Zeszyty Naukowe Wyższej Szkoły Rolniczej* (*Melioracja 3*), *Wrocław* No. 13, 1958 (81–104). 18 refs. [Pol.e.]

A 0·5-ha. sample plot was set up in a 100-year Pine stand at its margin, where it flanked a channel that had been used since 1909 for conveying sewage water to irrigate fields. The plot was divided into 4 strips, 20 m. wide, running parallel to the channel. Data were collected on the soil, ground flora, and tree diam. and height on each of the strips, and some increment cores were taken. Results indicated that inundation, with large quantities of sewage water remaining on the surface for several days, destroyed the trees. The growth of trees in the strip nearest the periodically inundated ground showed a definite increase due to percolation of the sewage water through the loose, sandy soil. This influence was clearly marked for a distance of 20–40 m.

238. Timber Plantation Crops requiring Special Treatment

See No. 1495.

24. Tending of Stands and Trees

1808. ARMĂŞESCU, S. Contribuţii în problema periodicităţii operatiunilor culturale în salcîmete. [**The timing of tending operations in Robinia stands.**] *Rev. Pădurilor* 1958 (6), (341–4). 4 refs. [Rum.russ. g.f.e.]

From a study of sample plots the author deduces that the first cleaning of Robinia plantations should take place in the 4th year and subsequent operations in the 7th, 10th, 14th and 20th years; the corresponding dates for coppice stands are 5th, 7th, 11th, 15th and 20th.

242. Thinning

See also Nos. 1629, 2204, 2240–1.

1809. SAVINA, A. V. Fiziologičeskoe obosnovanie rubok uhoda. [**The physiological basis of thinning.**] Goslesbumizdat, Moscow & Leningrad. 1956. pp. 74. 64 refs. [Russ.russ.] Price *Roubles* 2.40.

Collates the results (tabulated) of investigations carried out in various parts of Russia over a number of years [cf. *F.A.* 7 Nos. 221, 750, 762] to determine the effects of thinning on: (1) soil moisture and temperature, snow cover, and light intensity, in Scots Pine stands; (2) physiological processes in Pine, i.e. the development of foliage (weight and surface area), assimilation rate, cambial activity, and development of the annual ring; (3) wood structure in Pine, Oak and Aspen, e.g. changes in tracheid length and late-wood %.

1810. HEIBERG, H. H. H. Tynning i eldre bestand. [**Thinning in old stands.**] *Norsk Skogbr.* 4 (17), 1958 (483–5). [Nor.]

Discusses various possible treatments of old stands. Measurements (tabulated) 8–15 years after low thinning by Det norske Skogforsøksvesen in Spruce 95–140 years old suggest that it may have good results on increment, although the material is admittedly inadequate. No published figures are available for Pine, and Norwegian experience of crown thinnings is slight. Operations in a 300- to 400-year Pine stand in Sogn 400–650 m. alt., are described; here old and poor trees unlikely to live a further 15–20 years are first removed, and where healthy trees are overcrowded the larger ones are removed, leaving smaller thrifty ones. No attempt is made to avoid openings in the stand and it is hoped to discover from such openings whether natural regeneration is practicable.

1811. El raleo de plantaciones de pino insigne. [**Thinning *Pinus radiata* plantations. [Practical instructions.]**] *Boletin forestal, Plan Chillán, Chillán* No. 4 (2nd ed.) 1956. pp. 13. [Span.]

1812. STAGE, A. R. **Growth of thinned Ponderosa Pine in Western Montana.** *J. For.* 56 (10), 1958 (757–60).

Ponderosa Pine showed a marked increase in diam. growth after thinning, the response being more immediate (but of lesser magnitude) on better sites than on poorer ones. Net and gross volume increments were on average higher in the thinned stands than in the unthinned ones of near-normal density. Density after thinning showed a small effect on gross and net vol. increment, the maximum net increment being at 45–70% of normal b.a. Height growth of dominants and co-dominants was increased (significantly) by 19–31% following thinning. *From author's summary.*

1813. MYERS, C. A. **Thinning improves development of young stands of Ponderosa Pine in the Black Hills.** *J. For.* 56 (9), 1958 (656–9). 6 refs.

Plots to test three intensities of thinning were established in 1931–33 in each of three S. Dakota stands: (*a*) 28-year, densely stocked, (*b*) 40-year, densely stocked, (*c*) 55-year, overstocked. The plots were remeasured in 1956, when they showed greater diam., height, b.a., and pulpwood-volume increment than unthinned controls. Where sawlogs are to be produced with one precommercial thinning, the results suggest thinning to ca. 550, 425 and 300 trees/acre when mean d.b.h. is 1, 2–3, and 5 in. respectively.

1814. WHITE, L. C. **Methods of thinning of Sweet Gum [*Liquidambar styraciflua*] stands.** *Proc. 7th For. Symp. La. Sch. For.* 1958 (42–5). 1 ref.

1815. MCKNIGHT, J. S. **Thinning stands of Water Oaks.** *Proc. 7th For. Symp. La. Sch. For.* 1958 (46–50). 3 refs.

Deals with *Quercus nigra*, *Q. phellos*, *Q. nuttallii* and *Q. palustris.*

1816. OBYE, K. D. **Thinning Cottonwood [*Populus deltoides*] and Willow [*Salix nigra*].** *Proc. 7th For. Symp. La. Sch. For.* 1958 (35–41). 5 refs.

Summarizes several experiments in thinning dense natural stands.

1817. SETH, V. K. **Thinnings in the young Teak coppice forests of the Betul division.** *Indian For.* 84 (9), 1958 (568–70). 3 refs.

Describes the method of thinning used (single-stem silviculture), and the results, which appear to justify the use of this method. [Cf. *F.A.* 13 No. 3832.]

243. Opening of the Canopy (Increment Fellings, Overhead Release and Improvement Fellings)

See also Nos. 1810, 1833, 1958, 1965, 1982–5, 2179.

1818. COOLEY, J. H., and LORD, W. B. **A study of Aspen-Balsam Fir cutting methods in Northern Wisconsin—five-year results.** *J. For.* 56 (10), 1958 (731–6). 11 refs.

In spring 1950, in a stand having an upper storey of Aspen and Paper Birch (ca. 75% of the total b.a.) and a lower storey mainly of Balsam Fir, four treatments were applied: (1) complete removal of all Aspen and Birch; (2) removal of all Aspen and Birch stems containing ⩾ 2 pulpwood logs; (3) removal of all Aspen and Birch with ⩾ 3 pulpwood logs; (4) removal of 1- and occasional 2-log Aspen and Birch. Preliminary results indicate (2)

to be more advisable than (1); (4) is uneconomic and cannot be recommended; (3) appears to be achieving the maximum early lower-storey release consistent with minimum reduction of total yield from the upper storey.

1819. SUMMERS, J. H. **Improvement fellings in Southern hardwoods.** *Proc. 7th For. Symp. La. Sch. For.* 1958 (64–9). 7 refs.

1820. MCWILLIAMS, J. S. **Cull tree removal in bottomland hardwoods.** *Proc. 7th For. Symp. La. Sch. For.* 1958 (51–63). 4 refs.

Discusses intensity of operations, marking etc., rather than methods of removal (in fact, girdling is usually employed rather than poisoning).

1821. LAUNCHBAUGH, J. L., BISWELL, H. H., and SCHULTZ, A. M. **The control of Digger Pine [*Pinus sabiniana*] with herbicides placed in basal cuts.** *Journal of Range Management, Portland* 11 (1), 1958 (14–8). 10 refs. O.R.E.

Experiments were made from 1950 to 1954 with 2,4-D (amine and ester), NH_4 sulphamate, MCPA (Na and amine salts), and 2,4,5-T ester. The most effective formulation was amine 2,4-D (5·5 lb. acid equivalent/gal.). For complete kills, notched cups $\leqslant$ 4 in. apart were necessary. Best effects were obtained during late autumn, winter and early spring. Dormant trees in a dry soil showed some resistance.

245. Tending of Trees, Pruning etc.

See also Nos. 1839, 2203.

1822. KARL, G. Vergleich einiger Astsägentypen. **[Comparison of some types of pruning saws.]** *Int. Holzmarkt* 1958 (20), (10–1). [G.]

Discusses the silvicultural and technical requirements for a pruning saw, gives specifications of 7 types tested, and discusses their relative merits.

1823. DAVIS, G. **Growth of White Pine and Red Spruce trees after pruning.** *For. Res. Note Ntheast. For. Exp. Sta.* No. 83, 1958. pp. 2.

Five years after crop trees of Red Spruce and White Pine in Maine (mean diam. 6·1 and 7·7 in. respectively) were pruned to 18 ft., diam. increment of the Spruce was only $\frac{2}{3}$ that of the Pine. Some Spruce with long crowns grew fast enough to make pruning profitable, but a more reliable indicator of fast growth needs to be found.

1824. HAMNER, C. L., and RAI, G. S. **Growth inhibition studies with ornamentals and shade trees.** *Hormolog, Ambler, Pa.* 2 (1), 1958 (11–3). 5 refs. O.R.E.

Well developed trees of *Acer rubrum, Ulmus parvifolia, U. americana* and *Salix babylonica* of fairly uniform size and maturity were given foliar applications of maleic hydrazide at 2000 and 8000 p.p.m. in early spring. Results after 2 years were variable though promising, and call for more work before definite conclusions can be reached. *A. rubrum* responded markedly; the growth suppression persisted throughout the season, and the pattern of growth was essentially the same in 2 years of observation.

26. Combinations of Forestry with Agriculture and Pastoral Husbandry. Irrigated and Floodland Forests, Shelterbelts etc., and their Treatment

261. Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land

See also Nos. 2648, 2655.

1825. BARRIE, J. W. **Population—land investigation in the Chimbu sub-district [New Guinea].** *Papua N. Guinea agric. J.* 11 (2), 1956 (45–51). E.M.B.

Describes, with crop lists, 3-year rotations on two soil types. In the 2nd and 3rd years *Casuarina* [species not stated] is planted for a 10- to 20-year fallow. It supplies pig-fence and other material for the next crop rotation. Growth and survival of the tree are often poor on drier, steeper slopes.

264. Farm Forests

See also No. 2656.

1826. EDLIN, H. L. **Farm woodlands: past and present.** *Agriculture (J. Minist. Agric., Lond.)* 65 (2), 1958 (70–3). 8 refs. O.R.E.

Discusses reasons, both utilitarian and aesthetic, for having trees on farms, and the merits of woods (usually coppice) on poor-quality land left over from agriculture; hedgerow trees; and shelterbelts.

1827. RAMAKRISHNA, A. **Why not have a woodlot on your farm?** *Indian Fmg.* 8 (6), 1958 (30–2). O.R.E.

Cites the U.S.A. as an example of the possibilities of farm woodlands, and outlines the advantages of such woodlands in India, discussing the most suitable species.

266. Shelterbelts, Windbreaks

See also Nos. 1401, 1403, 1673, 1826.

1828. MAZEK-FIALLA, K. Organisation und Technik des Bodenschutzes (Windschutzes) in Niederösterreich. **[Organization and technique of soil conservation (wind protection) in Lower Austria.]** *Allg. Forstzeitschr.* 13 (38), 1958 (537–41). [G.]

Discusses size of working gangs and equipment employed, and techniques of planning, land acquisition, planting, tending etc. in a centrally directed scheme for establishing a network of shelterbelts in the agricultural region (ca. 400,000 ha.) to the S., E., and N. of Vienna. [Cf. *F.A.* 19 No. 443.]

1829. MIRONOV, V. V., and SAVEL'EVA, L. S. Effektivnost' lesnyh polos v bor'be s pyl'nymi burjami v stepah Severnogo Kavkaza. **[The effectiveness of shelterbelts against dust storms in the N. Caucasus.]** *Lesn. Hoz.* 11 (2), 1958 (25–9). [Russ.]

An account of the effectiveness of various shelterbelts in several districts against storms with wind speeds of 20–25 m./sec. To prevent seed and young crops from blowing away, the belts should be $\geqslant$ 500–600 m. apart and $\leqslant$ 10–12 m. high.

1830. BEŞKÖK, E. Koruyucu orman şeritleri ve balâda koruyucu orman şeritleri tesisi denemeleri. **[Shelterbelts and establishment trials in Balâ.]** *Orm. Araşt. Enst. tek. Bült.* No. 7, 1957. pp. 138. 104 refs. [Turk.turk.e.f.*e.*]

Seven shelterbelts, totalling 5610 m. in length, were started in 1954 in an experimental area in Central Anatolia at ca. 950 m. alt. on a 5–17% slope facing N.E. The belts were 30 m. wide and had 10 rows of trees and shrubs. Observations were made on the relative success of planting and sowing with different species at different seasons. Weeding and watering aided height growth. *Robinia pseudoacacia* gave the best height growth. *Ailanthus altissima*, *Pinus nigra*, *P. sylvestris*, *Gleditsia triacanthos*, *Ulmus campestris*, *Quercus haas*, *Q. macrolepis*, and *Sophora japonica* all show promise as regards height growth and survival. Sown *Juniperus* spp. have failed, and hot winds damaged *P. sylvestris* needles. Some rodent attack has been noted on seedlings and shoots.

1831. CABORN, J. M. **Some observations on snow drifting near barriers.** *Repr.* from *Weather, London* 13 (8), 1958 (264–7).

Notes on a Canadian shelterbelt consisting of outside rows of *Caragana arborescens* 4–5 ft. high enclosing two rows of *Acer negundo*.

268. Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.

See also Nos. 1958 *et seq.*

1832. WHYTE, R. O. **The grassland and fodder resources of India.** Indian Council of Agricultural Research, New Delhi. 1957. pp. v + 437 + 50 photos. 15 pages of refs. Price *Rs.*16 (£1. 16*s.*).

Includes chapters on grazing in forests and its regulation.

1833. BASKETT, T., DUNKESON, R. L., and MARTIN, S. C. **Responses of forage to timber stand improvement in the Missouri Ozarks.** *J. Wildlife Mgmt.* 21 (2), 1957 (121–6). 5 refs. B.A.P.

A study was made on a 12.5-acre area of Post Oak, Blackjack Oak, Black Oak, and Hickory (*Carya texana*). The area was thinned by girdling cull trees (without poison) in 3 parallel strips 233 × 700 ft. [distance between strips not given]. Despite the effects of a severe drought, this standard silvicultural procedure stimulated forage plants.

1834. MCCOMB, A. L., and THOMSON, G. W. **Growth of Oaks in S.E. Iowa in relation to stand density and grazing.** *Proc. Iowa Acad. Sci.* 64, 1957 (93–103). 12 refs. L.S.

Data are given on height, diam. and volume growth in the 10 years 1933–43 from 15 farm-woodland plots of ¼ acre each in 70- to 90-year White Oak in S.E. Ohio. The sites were as comparable as could be found, except for grazing intensity and stand density, classified as high, medium and open wooded pasture. An almost linear relationship (correlation coefficient 0·936) was established between m.a.i. and b.a. It is suggested that differences in volume growth are brought about (*a*) by a real decrease in growth associated with decreasing stand density, and (*b*) as a result of site modification by grazing, as shown by shorter trees on the more heavily grazed plots, though average site index as related to grazing varies only from 47 to 45.

1835. JOHNSON, W. M., and REID, E. H. **Herbage utilization on Pine-bunchgrass ranges of Colorado.** *J. For.* 56 (9), 1958 (647–51).

Analyses the consumption of the 6 most important herbage plants on Ponderosa Pine/bunchgrass ranges grazed lightly, moderately, and heavily, and concludes that *Festuca arizonica* and *Muhlenbergia montana* are the most palatable and productive grasses.

27. Arboreta. Arboriculture for Ornamental Purposes. Hedges and Hedge Plants

See also No. 1824.

1836. LIÉNARD, U. G. Catalogue des essences forestières composant l'arboretum géographique de Tervuren. **[Catalogue of the forest tree species forming the geographic arboretum of Tervuren.]** Administration de la Donation Royale, Brussels. 1958. pp. 69 + 2 maps. 27 refs. [F.] Price *Belgian Fr.* 30.

The catalogue, like the arboretum itself, is arranged by geographical regions.

1837. EDER, H. Arboretum w Rogowie. **[The Rogów arboretum.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (185–213 + 1 map). 7 refs. [Pol.russ.e.]

An account of the history of the arboretum (started in 1925), its climatic conditions, and the more important and interesting species represented.

1838. PHILIPPIS, A. DE. Note sur le populetum méditerranéen du centre d'expérimentation agricole et forestière de l'Ente Nazionale per la Cellulosa e per la Carta, Rome. **[Note on the Mediterranean Populetum of the research station for agriculture and forestry of the Ente Nazionale per la Cellulosa e per la Carta, Rome.]** [*Docum.*] *14th Sess. Stand. exec. Comm. int. Poplar Comm., Rome 1958* No. *FAO/CIP/CP* 17, 1958. pp. 8. [F.] Limited distribution.

Describes the situation, soil, climate etc. of the Populetum established in March 1958 near Battipaglia (Salerno) and the collection of mountain Poplars at Cucullaro (Calabria) at 900 m. alt., with lists of varieties and their origins.

28. Husbandry of Forest Products Other than Wood

See also No. 2648.

281. Christmas Trees

1839. BRAMBLE, W. C. **Effect of time of initiating shearing on form of Scotch Pine grown for Christmas trees.** *Res. Pap. Pa. St. For. Sch.* No. 25, 1958. pp. 4.

An experiment showing that 'late' cutting back (i.e. at 3½–4½ ft. high, generally in the 5th year after planting out) of current growth of leaders and

laterals, to be repeated annually till harvested, gives denser and shapelier trees.

282. Bark Crops

See also No. 2139.

1840. Les suberaies de la Corse: possibilités d'amélioration et de développement. [**The Cork stands of Corsica: possibilities of improvement and development.**] [*Docum.*] *4th Sess. Wkg. Party on Cork Oak FAO Jt. Subcomm. Medit. For. Probl., Madrid 1958* No. *FAO/SCM/LG/2-B*, 1958. pp. 23. 17 refs. [F.]

1841. Politiques subéricoles dans les pays producteurs: Italie. [**Cork-growing policy in producer countries: Italy.**] [*Docum.*] *4th Sess. Wkg. Party on Cork Oak FAO Jt. Subcomm. Medit. For. Probl., Madrid 1958* No. *FAO/SCM/LG/2-D*, 1958. pp. 9 [F.]

Reviews history, present conditions, and protection of Cork stands in Italy.

283. Fruit and Seed Crops etc.

See also No. 1628.

1842. ŠOBEK, J. Ořešákové oblasti. [**Walnut growing regions [of Czechoslovakia].**] *Sborn. čsl. Akad. zeměd.* (*rost. Výroba*) 4 (2), 1958 (173–88). 10 refs. [Cz.cz.russ.g.] C.G.B.

Compares the temperature, light, moisture and soil conditions of Czechoslovakia with those of other successful Walnut-growing countries, and on this basis divides Czechoslovakia into 4 zones—ranging from that where large plantations of Walnuts could be established, to that where Walnuts should not be planted at all.

284. Crops Tapped for Exudations etc.

See also No. 1770.

1843. . NÁJERA, F. Le gemmage—ses avantages et ses inconvénients—aspects techniques et économiques: Espagne. [**Resin tapping—its advantages and disadvantages—technical and economic aspects: Spain.**] [*Docum.*] *6th Sess. FAO Jt. Subcomm. Medit. For. Probl., Madrid 1958* No. *FAO/SCM/67-A*, 1958. pp. 8. [F.]

Discusses the factors involved and concludes: (1) having regard to the current high value of timber, French faces as used in Spain (12 cm. wide, 3·4 m. high and 1·5 cm. deep), which cause extensive resin-soak, are uneconomic; (2) American faces with chemical stimulation are to be recommended when trees are to be felled at once for timber production; (3) where tapping is to extend over a long period (20–25 years) the system of 'multiple faces' should be used. In this system five narrow faces, 22 mm. wide, 22 mm. apart, and 10 mm. deep, are started near the base of the tree and worked upwards, giving 198 mm. combined width of face and 110 mm. width of actual tapping surface. The advantages of the system compared with French faces, is (*a*) rapid healing of faces, (*b*) reduction in timber loss, (*c*) yields 8–10% greater, (*d*) easily learned technique. The two disadvantages are that it requires more climbing, and freshening takes longer.

1844. KAMIŃSKI, E. Żywicowanie przy użyciu chemicznych środków drażniących. [**Resin-tapping, using chemical stimulants.**] *Sylwan* 102 (7), 1958 (8–37). 35 refs. [Pol.russ.e.]

In the U.S.S.R. the most usual stimulant is a paste of H_2SO_4 and $CaOCl_2$; in the U.S.A., H_2SO_4 diluted with water to 40–60%. Research on chemical stimulants and their application in these two countries and in Poland is discussed.

1845. KOMAROVSKIJ, V. N. Podsočka metodom nepreryvnogo himičeskogo vozdejstvija. [**Resin-tapping using continuous chemical stimulation.**] *Gidrol. lesohim. Prom.* 11 (1), 1958 (20–1). 1 ref. [Russ.] P.R.

[Cf. *F.A.* 17 No. 2824.] Applications of 0·01–0·005% Cu, Zn and Mg sulphates to *Pinus sylvestris* [locality not stated] increased resin yields (on a 7-day freshening cycle) by 76–92%, the highest increase being given by 0·01% $MgSO_4$. Spraying with water alone for two seasons gave an average increase of 45%.

1846. ŠATERNIKOVA, A. N. Ispol'zovat' krymskuju sosnu dlja sozdanija vysokosmolonosnyh drevonasaždenij. [**The use of Crimean Pine [*Pinus nigra* var. *caramanica*] for valuable resin-producing stands.**] *Gidrol. lesohim. Prom.* 10 (4), 1957 (18). [Russ.] P.R.

Urges the cultivation of Crimean Pine in preference to Scots Pine in the southern steppes, as it is more drought-resistant and has a higher % of late wood and better mechanical properties. Data are given on the amount of carbohydrates in g. per tree for both species.

1847. MAŠNINA, T. I. O vlijanii udlinennoj podsočki sosny na rasprostranenie vreditelej. [**The influence of prolonged resin-tapping of *Pinus sylvestris* on insect pest distribution.**] *Gidrol. lesohim. Prom.* 10 (6), 1957 (15–7). 7 refs. [Russ.] P.R.

Sampling 0·5 ha. of a 105-year Pine stand in Gomel province, tapped for 11 years, showed the most widely distributed insect pests to be *Blastophagus minor*, *Phaenops cyanea*, *Ips sexdentatus* and *Monochamus galloprovincialis*. The author concludes that, though resin-tapping may in the first 2–3 years hasten insect attack on trees already weak, this does not lead to a general increase of pests in the stand, which in this case was ascribed to weakening of trees by root rot (*Fomes annosus*), infestation from a breeding ground of slash and debris on an adjacent felled site and, finally, weakening of the tree by extension of the faces. If physiologically weak trees, weakened further by tapping, are removed in the first few years, the rest of the stand should survive under further tapping for ⩾ 10 years.

288. Crops Grown for Animal Products

1848. ZANOWA, M. Drzewa i krzewy miododajne. [**Trees and shrubs as bee pasture.**] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958) (551–76). 94 refs. [Pol.]

A review of literature, mainly Polish, Russian and German.

3. WORK SCIENCE (WORK STUDIES). HARVESTING OF WOOD: LOGGING AND TRANSPORT. FOREST ENGINEERING

30. Work Science (Work Studies): General

1849. PLATZER, H. B. Über die Durchführung arbeitstechnischer Betriebsüberprüfungen und Betriebsberatungen. **[Appraising and advising on [forest] working methods.]** *Forstwiss. Cbl.* 76 (5/6), 1957 (159–74). 6 refs. [G.g.]

Discusses the examination of forest estates, with a questionnaire on working methods, techniques, equipment etc., and explains, with an example, methods of improving conditions, output and efficiency.

1850. VÖRY, J. **Research and experimental work for the rationalisation of logging operations.** *Finn. Pap. Timb.* 9 (6), 1958 (85–8). [E.]

Discusses the work done by Metsäteho since its inception in 1945 on e.g. wage standards and working methods.

302. Man and Work (Physiology and Psychology)

1851. STENTZEL, E. E. Physiologie der Waldarbeit. **[Physiology of forest work.]** *S.B. dtsch. Akad. LandwWiss., Berl.* 6 (10), 1957. pp. 45 + 2 plates. 91 refs. [G.g.russ.e.]

A lecture discussing principles and methods, partly using as illustration some more recent research into the effect on power-saw performance of handle position, and the time, effort and calorie consumption of methods of stacking, cross-cutting and loading, and of making planting holes with borers or by hand, etc.

1852. PROKOPEC, M., and SUCHÝ, J. Anthropometrie československých lesních dělníků 1950–1952. **[Anthropometry of Czechoslovak forest workers, 1950–52.]** *Práce výzkum. Úst. lesn. ČSR* No. 14, 1958 (11–54 + 1 tbl.). 29 refs. [Cz.russ.g.]

Presents and discusses the results of studies on ca. 3000 workers of both sexes, based on 32 physical criteria.

1853. ZELENÝ, A., and ČERMÁK, K. Význam fysiologických studií práce lesních dělníků a používané metody. **[The importance of physiological studies on forest workers, and methods used.]** *Práce výzkum. Úst. lesn. ČSR* No. 14, 1958 (55–66). 24 refs. [Cz.russ.e.]

Reviews literature (mainly Czech and German) and on this basis assesses the present position of physiological research in forestry.

1854. AGER, B. H. En undersökning på virkeskörare av arbetstyngdens variation med köravståndet. **[Variations in the heaviness [for man, of horse-] skidding work with skidding distance.]** *Medd. SkogsforsknInst., Stockh.* 47 (9), 1958. pp. 51. 18 refs. [Sw.sw.g.]

Analyses physiological data for one man of good physique in connexion with loading and unloading of pulpwood and pitprops and leading the horse from felling site to roadside, with or without snow on the ground, and discusses methods and theoretical questions. Under the conditions of the test, the worker was thought not to be overtaxed even where the walking distance (which rests him) was short.

1855. ZELENÝ, A., KOZÁK, J., and STOLAŘÍK, R. Energetický výdaj při přibližování a odvozu dříví. **[The expenditure of energy in skidding and extracting wood.]** *Práce výzkum. Úst. lesn. ČSR* No. 14, 1958 (85–96). [Cz.russ.e.]

Investigations were made on the energy expenditure in extracting short logs of Beech with a horse-drawn wagon, and loading them on to a lorry, and in skidding tree-length logs by horse and by crawler tractor, and loading them on to a lorry by a power winch. It was found that the mechanized skidding and loading of tree-length logs required less human effort than unmechanized skidding and loading of short logs.

1856. ZELENÝ, A., *et al.* Energetický výdaj při práci na manipulačním skladu a při nakládání manipulovaného dříví na vagony. **[The expenditure of energy in industrial log depots and in loading wood on railway wagons.]** *Práce výzkum. Úst. lesn. ČSR* No. 14, 1958 (97–109). [Cz.russ.e.]

Presents tabulated results of measurements of the energy expended by 15 healthy, skilled workers, (1) cross-cutting tree-length logs with an electric chain saw and a power saw, (2) barking 1-m. logs with a barking knife, and (3) loading pitprops, 2·5 m. long, into railway wagons by (*a*) manual work, (*b*) conveyor belt, (*c*) chain loader, and (*d*) a small cableway. Split Beech fuelwood was also loaded into wagons and stacked manually. The advantage of dealing with tree-length logs in these depots is evident.

1857. ZELENÝ, A., KOZÁK, J., and LUKÁČ, V. Energetický výdaj při plavení rovaného dříví. **[The expenditure of energy in floating short logs.]** *Práce výzkum. Úst. lesn. ČSR* No. 14, 1958 (111–25). [Cz.russ.e.]

Floating logs were pulled from the water by hand or with a hook, up a bank 30–80 cm. high, and stacked along the roadside. The energy expenditure was compared with that of pushing the floating logs to an electric chain conveyor, and then stacking them by hand. The conveyor saved > 75% of the energy needed to pull the logs out by hand. Stacking took the same effort in each case.

304. Hygiene. Safety; Accidents and their Prevention

See also Nos. 1898, 2363, 2368.

1858. **The collection, compilation and analysis of forest accident statistics.** [*Publ.*] *FAO/ECE Jt. Comm. Working Tech.* No. *FAO/ECE/LOG/29*, 1958. pp. 75 + 8 photos.

Discusses the present situation in a number of countries, makes recommendations for the collection of statistics, and gives specimen forms for the reporting of accidents etc. A 25-page annex on

'Statistical analysis of forest accidents' (by *J. N. R. Jeffers*) is appended.

1859. Čermák, K. Bezpečnost práce lesního dělníka. [**The safety of forest workers.**] *Práce výzkum. Úst. lesn. ČSR* No. 14, 1958 (127–54). 21 refs. [Cz.russ.g.]

Statistically treated information obtained from replies to a questionnaire on accidents showed that the accident rate (a.r.) was highest for workers < 30 years old, after which it fell, only to rise again for workers > 45. The a.r. was higher in summer than in winter, in selection forests than in forests managed by clear felling, and in mixtures than in pure crops. Most accidents occurred during fellings, Firs being the most dangerous, followed by Oak, Larch, Beech and Pine in that order. Wood transport and skidding show the next two highest a.r.'s. In 45% of the accidents the legs and feet were affected, the arms and hands in 35%, the body in 11%, and the head in 9%. Most accidents are caused by tree stems and large assortments, though accidents due to machinery are on the increase. Most accidents are the fault of the injured person himself; 95% of all accidents are not of a serious nature. [Cf. *F.A.* 16 No. 3045.]

1860. Čermák, K., and Kubička, J. Nemocnost lesních dělníků. [**Illnesses of forest workers.**] *Práce výzkum. Úst. lesn. ČSR* No. 14, 1958 (156–76). 10 refs. [Cz.russ.g.]

Discusses conclusions drawn from the results of full medical examinations of 3067 Czechoslovak forest workers, from which 211 different illnesses, and 58 kinds of accident were determined. [Cf. *F.A.* 19 No. 4228.]

307. Tools, Equipment, Machines and Working Animals: General

See also Nos. 1654, 1699–1700, 1725, 1739, 1766–8, 1911, 1948–9, 1953.

1861. Sistema mašin dlja kompleksnoj mehanizacii sel'skohozjajstvennogo proizvodstva. 16. Lesnoe hozjajstvo i polezaščitnoe lesorazvedenie. [**Machinery systems for full mechanization of agricultural production. 16. Forestry and shelterbelts.**] Izdatel'stvo Ministerstva Sel'skogo Hozjajstva SSSR, Moscow. 1957. pp. 84. [Russ.]

Lists combinations of machinery and implements for mechanizing the whole gamut of tasks in silvicultural work, roadbuilding, drainage, fire control, disease and pest control etc., the tractor to be used with them, their labour requirement, working life, performance etc., and indicates the state of availability of the individual machines and implements.

1862. Løvland, A., and Vevstad, A. Kjempemønstring av skogbruksmaskiner på St. Eriksmessen. [**Giant display of forestry machinery at the St. Erik's fair [Sweden].**] *Norsk Skogbr.* 4 (18), 1958 (515 . . . 520, 539). [Nor.]

Includes brief descriptions of power saws, chippers, barking machines etc. (mostly Swedish).

1863. Fortschritte in der forstlichen Mechanisierung. Waldwirtschaft auf der St. Eriks-Messe 1958 in Stockholm. [**Progress in forest mechanization. Forestry at St. Erik's Fair, 1958, in Stockholm.**] *Allg. Forstzeitschr.* 13 (36), 1958 (517–9). [G.]

Discusses and illustrates tractors, their tyres and tracks, including a small crawler having only one broad track, power-saw accessories, barking machines, a pulpwood loader gripping the wood from the ends, etc.

1864. Informations sur le matériel. [**Equipment news.**] *Bois For. Trop.* No. 61, 1958 (79–84). [F.]

Describes, with drawings and specifications: the Rexo KS one-man chain saw (Éts. Rexo, Thiers, Puy de Dôme); Bulldozer Caterpillar 7G ('Gyrodozer'), a bulldozer blade for attachment to a crawler tractor, furnished with 4 large teeth and capable of being tilted 15° to left or right; the TV 60, TV 95 and TV 175 Noralpe crawler tractors [Richier group]; the TP 604 Chamond wheeled tractor [Cie. des Ateliers et Forges de la Loire, St. Chamond, Loire].

31. Logging and Transport: General

See also Nos. 2193, 2647.

1865. **List of publications on logging, milling and utilization of timber products.** *Rep. U.S. For. Prod. Lab., Madison* No. 790, 1958. pp. 21. P.R.

The references are all N. American, and largely to work done by the Madison Laboratory.

1866. Czereyski, K. Prace naukowo-badawcze w zakresie pozyskania transportu drewa w Związku Radzieckim. [**Scientific investigations on logging and timber transport in the U.S.S.R.**] *Sylwan* 102 (10), 1958 (47–62). [Pol.]

Report of a study tour in the U.S.S.R., discussing the administrative set-up and organization of research, and mentioning some of the more interesting and outstanding developments in mechanized logging and transport.

1867. Soetopo, M., Tedjokoesoemo, R. H., and Dijen, A. M. Pemungutan kaju ramin (*Gonystylus bancanus* Kurz) di negara Serawak. [**Exploitation of Ramin in the Colony of Sarawak.**] *Rimba Indonesia* 7 (3/4), 1958 (149–83). 28 refs. [Jav.e.]

Describes, in particular, treatment to prevent log deterioration, e.g. by early barking, creosoting and other preservative treatment, and end coating to prevent splitting, and makes recommendations on skidding methods, road, rail and water transport and preservative treatments, when exploiting the species in Indonesia.

1868. Duteil, H. Quelques exemples d'organisation de chantiers en exploitation forestière. [**Some examples of the organization of felling sites in logging operations.**] *Rev. for. franç.* 10 (8/9), 1958 (538–57). [F.]

A preliminary account of work studies in progress by the Forest Research Station of Nancy, on the organization of operations for exploiting coppice for fuelwood, with particular reference to mechanization (e.g. the use of power saws, wheelbarrows etc.).

32. Felling and Related Operations

See also Nos. 1851, 1856, 1878–82, 1888, 1900.

322. Felling Season. Preparatory Measures

See also No. 2512.

1869. PAVELESCU, I. M. Cîteva resultate ale unor cercetări in legătură cu exploatăile de fag pe tempul verii. **[Studies on the summer felling of Beech.]** *Rev. Pădurilor* 1958 (5), (253–6). 1 ref. [Rum.russ.f.g.e.]

Gives tabulated data on times taken for (*a*) felling, (*b*) primary conversion, for trees felled (*c*) on flat, (*d*) on sloping ground, in (*e*) summer, (*f*) winter, for different felling systems. Summer operations in all cases took longer. Data are also given on the occurrence of checking, before and after conversion for (*e*) and (*f*), and for different storage conditions.

1870. LAUROW, Z. Zastosowanie siły ssącej korony do suszenia drewna. **[Reducing the moisture content of wood by the transpiration of the crown.]** *Sylwan* 102 (9), 1958 (49–54). 11 refs. [Pol.]

Reviews Russian, German and Polish experience. [Cf. *F.A.* 16 No. 512; 17 No. 2846; 18 No. 1657.]

1871. PEREM, E. **Bark adhesion and methods of facilitating bark removal.** *Pulp Paper Mag. Can.* 59 (9), 1958 (109–14). 73 refs.

A general summary based on published articles in journals of general science, botany, forestry, and technology under the heads (*a*) bark adhesion and its seasonal variation (34 refs.), (*b*) methods used for barking and facilitating it (23), and (*c*) facilitating bark removal by initiating cambial activity (16).

1872. WOOD, R. F., and HOLMES, G. D. **Chemical bark peeling.** *Rep. For. Res. For. Comm., Lond. 1956/57*, 1957 (43–4).

Trials of chemicals with a lower mammalian toxicity than Na arsenite were completed in 1956, and Polybor-chlorate, $Na_2B_{10}O_{16}$, $NaClO_3$, and 3-amino-triazole proved completely ineffective for bark peeling purposes for Sitka Spruce, European Larch, Scots Pine and Aspen, which were selected as test species. Na PCP, however, appears promising on Scots Pine and Aspen, but had little value for the other two species. An interesting result was that 4% 2,4,5-T, (butyl ester) in oil, applied as a basal bark spray, greatly improved the peeling properties of European Larch, Scots Pine and Aspen. Sitka Spruce failed to respond appreciably to any of the materials tested. Preliminary studies were also completed using the 'Wilcox' bark-peeling gauge to assess natural variations in bark looseness over the season for Oak, Beech, Scots Pine, Corsican Pine, Japanese Larch, Norway Spruce, Sitka Spruce and Douglas Fir. First results indicate close similarity between species in resistance to peeling in the season of sap rise, but considerable differences in the pattern of peeling at other times.

1873. SHIUE, C-J., REES, L. W., and BROWN, R. M. **Some anatomical and physiological changes in Quaking Aspen [*P. tremuloides*] induced by bark removal with 2,4,5-T.** *For. Sci.* 4 (3), 1958 (212–8). 7 refs.

In contrast with other experiments [cf. *F.A.* 16 No. 3054, but cf. also *F.A.* 19 No. 470], promising results were shown in a 2-year comparison of the peeling resistance of untreated trees with that of trees whose bark was sprayed at breast height with the butoxyl ethyl ester of 2,4,5-T (21 lb. acid equivalent/100 gal. diesel). This treatment induced increases in the osmotic pressure of parenchyma cells and of wood and bark moisture (m.c.), the formation of abnormal phloem parenchyma, and the development of tyloses in the sapwood [cf. *F.A.* 17 No. 3348], while preventing the secondary thickening and lignification of the walls of the immature wood elements. Ease of peeling is due to the weakness of this immature layer that forms during the rapid growing period (May–June, the 'sap peeling' season). Spraying at this time prevents this layer from maturing, and maintains ease of peeling into the winter and even into the seasoned log, which was practically as easy to peel when wood and bark m.c.'s were down to ca. 30%.

1874. BOYCE, A. P., and VERME, L. J. **Toxicity of arsenite debarkers to deer in Michigan.** [*Paper*] *16th Midwestern Wildlife Conference, St. Louis 1954.* pp. 9 + 3. From *abstr.* in *Wildlife Review, Laurel, Md.* 81, 1955 (7). B.A.P.

Porcupines, rabbits, and several deer were found dead after chemical barking operations; autopsies revealed the presence of lethal amounts of Na arsenite. Evidence was found that animals were getting lethal dosages from spilling or accumulations at the bases of trees that had received excessive applications. As little as 4 c.c. of the solution proved lethal to a yearling deer. A preference was shown for red-dyed chemicals, but none between different arsenite compounds and common salt. Unsuccessful tests were made with ca. 50 possible deer repellents.

33. Degree of Utilization and Waste. Clearing the Felling Site. Harvesting of Small Wood. Salvage Fellings

See also No. 1883.

1875. HOOKER, L. W. **Utilization of hardwood logging residues.** *Proc. 7th For. Symp. La. Sch. For.* 1958 (102–9).

1876. WEISMANN, A. Die Aufarbeitung von Windwurfholz. **[The logging of windthrows.]** *Allg. Forstzeitschr.* 13 (36), 1958 (509–12). 8 refs. [G.]

An illustrated general article discussing technical problems, equipment (winches, stem-presses, etc.), safety, organization of work, and payment. The traditional large gangs and very high special rates are thought to be both dangerous and wasteful.

35. Performance Measurements for Determining Piece Rates in Felling and Related Operations

See also Nos. 1868–9, 1879.

1877. MAKKONEN, O. Aikatutkimuksia puutavarastoilla suoritettavista töista. **[Time studies on the work done at timber storage depots.]** *Tied., Metsäteho, Helsinki* No. 150. pp. 7. [Fi.e.*e.*] (*Repr.* from *Metsät. Aikak.* 1958 (8/9).)

Presents tables showing the results of time studies on stacking and barking, and preparing pulpwood and fuelwood of different lengths and species from long logs and from standing trees, etc.

36. Tools, Machines and Equipment for Felling and Related Operations

See also Nos. 1822, 1851, 1862–4, 1876, 1888.

1878. NOYSZEWSKI, J., and BAŃBURA, B. Systemy mechanicznego korowania drewna. [**Methods of mechanical barking.**] *Sylwan* 102 (4), 1958 (86–102). [Pol.]

Describes, and gives performance figures for, 13 W. German, Finnish and Swedish barking machines.

1879. SALMINEN, J. Tutkimus Partner kutterikuorijasta. [**Investigation of the Partner cutter barker.**] *Tied., Metsäteho, Helsinki* No. 149, 1958. pp. 11. [Fi.e.]

Barking when the ground was not frozen took longer with the cutter barker attachment to the Partner power saw [illustrated] than by hand with a barking knife, and costs were higher. The difference in working time decreased with increasing stem volume, and was less during frost. *From author's summary.*

1880. DRECHSLER [DREHSLER], M. M., and OSIPOV, A. I. **Mechanization of limbing operations.** *Transl. For. Prod. Lab. Can.* No. 119, 1958. pp. 12 + 1 tbl. Transl. from a Russian booklet issued by Department of the Lumber Industry of the RSFSR, 1957 (pp. 66–73, 86–94). Limited distribution.

Describes [with illustrations in the original, not reproduced in the translation]: circular saws, CNIIMÉ RES models 2, 3 and 4, designed for trimming; a barking-trimming machine, with a rotating cutting head; and the CNIIMÉ barking-trimming machine consisting of feeding conveyor, cutting head, barking head, equipment for removing and chopping or crushing branches, and for bundling etc. An appendix gives in tabular form technical descriptions of 8 disk trimming saws including the RES models described in the text.

1881. PLATZER, H. B., and SACKEL, W. Über die Instandsetzung und Pflege der Hobel- (auch Rund- oder Schaufel-) Zahnkette der Einmannmotorsäge. [**On the care and maintenance of plane-tooth chains of one-man power saws.**] *Forst- u. Holzw.* 13 (20; 21), 1958 (400–3; 428 . . . 433). [G.]

(1) An illustrated description of cutting theory, and of practical maintenance. (2) Describes some setting and sharpening devices produced by commercial firms.

1882. MÜLLER-THOMAS. Übertreibungen und Unterlassungen im Hauungsbetrieb, insbesondere bei der Schichtholzaufarbeitung. [**Exaggerations and omissions in logging, particularly in the primary conversion of cordwood.**] *Forsttech. Inform., Mainz* 1958 (11), (79–90). 19 refs. [G.]

Discusses various means of rationalization by organization of work and equipment (whereby the economic efficiency of power saws, though not necessarily their psychological advantage, is shown to be rather low) including a Swiss mobile circular saw with an attachment for barking, self-closing bundling frames etc.

1883. MIRON, V. Cercetări cu privire la forța de tracțiune necesară dezrădăcinării buturugilor de salcîm și de stejar. [**The tractive power necessary for uprooting stumps of *Robinia pseudoacacia* and *Quercus robur*.**] *Rev. Pădurilor* 1958 (6), (331–4). [Rum.russ.g.f.e.]

Describes experiments using the KD-35 tractor for small-diameter stumps and the S-80 tractor or a modified T-4 tank for large-diameter stumps, and develops a formula for determining the necessary tractive power: $F = 1{\cdot}67(D - 28) + 15$, where F = tractive power in metric tons and D = stump diameter in cm. at ground level.

37. Transport

372/377. Land Transport

See also Nos. 1854–6, 1861–4, 1866–8, 2119.

1884. MCGARRITY, W. F. **Tree length logging in Muskoka.** *Timber of Canada* 19 (8), 1958 (24–6, 28–30).

Covers the merits and procedure of a year-round operation in Birch/Maple/conifer forest in Ontario and includes planning, organization and equipment, production, work-study data and suggestions for improvement.

1885. REHSCHUH, D. Untersuchungsergebnisse über das sortenweise Rücken. [**Results of investigations on skidding by assortments.**] *Forst- u. Holzw.* 13 (20), 1958 (403–8). 11 refs. [G.g.]

Discusses the merits of full-tree logging and logging by assortments; proposes a method of organizing the skidding of assortments, time studies of which are presented for Beech and Spruce.

1886. KANTOLA, M. **The mechanical loading of timber on trucks.** [*Publ.*] *FAO/ECE Jt. Comm. Working Tech.* No. *FAO/ECE/LOG*/28, 1958. pp. 54 + 12 photos, 9 drawings, 1 gph. 25 refs. [E.e.russ.f.]

Supplements an earlier study by the same author [cf. *F.A.* 17 No. 2870]. The present study is based on answers to a questionnaire by the following countries: Austria, Belgium, Bulgaria, Czechoslovakia, Denmark, Federal Republic of Germany, Finland, France, Greece, Hungary, Iceland, Netherlands, Poland, Sweden, Switzerland, Turkey, U.S.S.R., Eastern Zone of Germany, and the U.S.A.

1887. **Logging equipment—what's new?** *Timber of Canada* 19 (8), 1958 (40 . . . 54).

Log-moving and loading equipment of 39 firms is listed. Loaders, skidders and yarders, crawler and wheeled tractors, mobile cranes, logging arches, haulage trucks, winch drums and tongs are included.

1888. **Machine harvests small trees and yards them vertically to landing.** *Timberman* 59 (5), 1958 (33).

Briefly describes (with photos of the machine in action) the Pope Timber Harvester, an experimental machine developed by North Western Pulp & Power Ltd., Hinton, Alberta, for harvesting trees up to 24 in. in diam. The unit is mounted on the C-frame of a medium-sized crawler tractor (a D7 Caterpillar in this case). It consists of two jaws, one capable of rotating 90°, the other mounted on a track so that it can slide, and a hydraulically operated chain saw. The left-hand or main jaw

seizes the tree and the saw makes the felling cut. Holding the tree upright, the tractor manoeuvres to the cross-cutting site. The whole tree is then lowered into the cradle formed by the right-hand or trimming jaw which slides on its track away from the butt of the tree, shearing and breaking off the branches as it goes. The grip of the main jaw is then released slightly and the trimming saw seizes the tree, pushing it out to the left side of the machine into a cross-cutting position. The chain-saw then comes out of its protective guard once more and cuts the log off at the required length (usually 8 ft.).

1889. KUZAVSKIJ, M. D. Perspektivy vnedrenija agregatnyh mašin na lesozagotovkah. **[The prospects for the use of large, multi-purpose machines in logging.]** *Lesn. Prom.* 1958 (9), (7–10). [Russ.]

Discusses three such machines: ZIL and MAZ lorries equipped with winches for skidding tree-length logs and for loading them in bundles on to the lorries; the VTA-2 tractor-based unit on to which trees can be felled directly for extraction [cf. *F.A.* 20 No. 554]; and a tractor-based road-building machine, having a skidding winch, a bull-dozer blade, a stump grubber, and a stacker.

1890. LAZIER, S. S. **The effect of wall roughness on the capacity of flumes.** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 109, 1958. pp. 13. 2 refs.

In tests of (*a*) an unlined wooden flume, (*b*) a wooden flume partly lined with aluminium, and (*c*) an all-aluminium flume, measurements were made of (1) the cross-sectional shape, (2) mean water velocity, (3) gradient as measured between the water surface at each end of the flume, and (4) depth of water at both ends. It was concluded that if (2) is taken as a measure of fluming capacity, that of (*c*) would be 8% > (*a*), but (*b*) would be no better than (*a*). By using (*c*), a saving of 15% in gradient could be achieved.

1891. WYSSEN, J. Nutzung und Pflege des Bergwaldes. **[Logging and care of mountain forests.]** *Int. Holzmarkt* 1958 (17/18), (41–8). [G.]

Discusses the advantages (e.g. direct saving in cost, less danger of erosion, little loss of productive forest land) of aerial cableways as compared with road networks in mountain areas, giving some estimate of comparative costs, and details of cable transport.

1892. ŠANCIN, V. B. Sannyj rospusk dlja moščnyh avtomobilej. **[A sledge for use with powerful lorries.]** *Lesn. Prom.* 1958 (10), (21–2). [Russ.]

Gives specifications of the two-runner sledge which has been developed for transport on ice roads. Of 12-tons load capacity, its track width is 195 cm., ground clearance 32 cm., and weight 1090 kg. Thirteen sledges have been built for trials. One end of a load of tree-length logs is supported by the sledge, the other end resting on a heavy lorry (MAZ-501). Loads up to 25 cu.m. can be carried in this way. The sledge is put on the lorry for the return trip.

1893. KAUFMANN, G. VON. Motorraupe zum Bergwärtsziehen von Handschlitten. **[A powered crawler for taking hand-sledges uphill.]** *Forstarchiv* 29 (8), 1958 (195–6). [G.]

Describes a power-driven crawler frame, only 85 × 58 cm. over-all, on to which empty hand-sledges can be loaded for the uphill return journey. The method of construction is described. The pilot model was used successfully in winter 1957–58 and is to be manufactured by a German firm.

1894. **Provisional protocol for the testing of forest tractors. (Revised document.)** [*Publ.*] *FAO/ECE Jt. Comm. Working Tech.* No. *FAO/EFC/Log* 64 Rev. 1, 1958. pp. 64 + 3 dgms. Price 3*s.* 6*d.* ($0.50 or *Swiss Fr.* 2.)

Obtainable from the Sales Section, European Office of the United Nations, Geneva. [Cf. *F.A.* 18 No. 509.]

1895. KEYS, G. T. **Oliver OC-4 tractor with pneumatic tire supported track.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1768 (*B-8-f*), 1958. pp. 3.

The conventional OC-4 crawler tractor is modified by removing the track and drive sprockets, and replacing them with the Alfta conversion set, consisting of 3 pneumatic tyres per side, and light steel tracks. The drive wheel connected in place of the normal drive sprocket has deep notches to mate with the steel bars on the inner surface of the tracks. The specifications of the conventional tractor, and of the modified version are listed. It is thought that the modification shows promise for work in snow and swamp, though some possible improvements are suggested.

1896. SÖDERLUND, J. A. Hjultraktorn i transportarbete på vägar av olika beskaffenhet. **[Wheeled tractors in transport work on roads of various constructions.]** *Svenska SkogsvFören. Tidskr.* 56 (3), 1958 (307–45). [Sw.sw.]

Describes tests made in summer and winter conditions, with two tractor models of ca. 35 h.p. and 2300 kg. weight, pulling a 2-wheeled trailer weighing, with load, 7500 kg. Of this weight, 1500 kg. were transferred to the tractor by linkage systems, of which the 'Livab', which acts on a point ca. 18 cm. in front of the rear axle, was superior to a hook-link acting on a point 18 cm. behind it, particularly as regards rearing of the front wheels. Transport halted on slopes owing to rearing or skidding, was set in motion again when power was transferred to the wheels of the trailer. It is concluded that agricultural tractors can only be satisfactory for heavy transport if linked to power-driven trailers by a linkage moving the centre of gravity well forward. [Cf. *F.A.* 17 No. 1662.]

1897. KISTENFEGER, J. Anforderungen an Schlepperseilwinden in der Forstwirtschaft. **[Requirements of tractor winches in forestry.]** *Forstarchiv* 29 (11), 1958 (254–6). [G.]

Details of construction are discussed with regard to forestry conditions.

1898. LYSEBRÅTE, K. Traktorulykkene i skogbruket. **[Tractor accidents in forestry.]** *Norsk Skogbr.* 4 (18), 1958 (508, 511–2). [Nor.]

Presents data for tractor accidents in Norway in 1956, discusses the main types of accident (e.g. overturning and rearing), and suggests points to be emphasized in a safety campaign.

1899. **[Helicopter logging.]** *For. Prod. J.* 8 (9), 1958 (9*A*–22*A*).

Five papers presented to section VII of the 1958 meeting of the F.P.R.S. It is hoped that twin-turbine helicopters, soon to be available commercially, will greatly increase pay-load (now the chief limiting factor) from the present weight of ca. 5000 lb., and reduce costs, estimated currently at $16.25/per 1000 bd. ft. for distances up to 5 miles. Requirements of a special 'flying crane' for logging are discussed. Examples of present successful uses include transport of building materials, of firefighters to site of fire, surveying and selection of routes for roads, and observations of log jams.

378. Water Transport

See also Nos. 1621, 1857, 1866–7.

1900. TUOVINEN, A. Jäälle varastoitujen havutukkien uppoamis- ja laatutappiot. **[Sinkers and quality losses in softwood logs stored on the ice.]** *Julk., Metsäteho, Helsinki* No. 40, 1958. pp. 40. 8 refs. [Fi.e.*e.*]

The buoyancy of Pine and Spruce logs (unbarked, and barked by various methods) which were stored on the ice on skids and in bundles in March, was measured in late May and in late August. In examining sinkage losses it was found that storage on cross-skids was of questionable benefit; that 'sheath-barking' [leaving a complete sheath of cambium and corky tissues] was competitive with normal [complete] barking; that there was an insignificant advantage in seasoning unbarked Spruce on skids, and that the advantage with Pine was limited to the start of floating; and that storage of barked Pine in bundles on the ice gave better results than the storage of unbarked logs, though with Spruce differences were not significant. Losses in quality were small, because no appreciable splits occurred before floating, and the most injurious insects did not attack logs stored on the ice. In barked Pine, quality loss was ca. 1·5%, in unbarked ca. 0·5%, the method of storing having no significant effect on losses. With Spruce the losses were of roughly the same order. Sheath-barking of Spruce reduced losses by ca. 0·7% compared with normal barking, but showed no advantage with Pine. Decay was due chiefly to storage rot, and occurred more in Spruce than in Pine, and more in the upper parts of bundles than in the lower. *From author's summary.*

1901. MIRMIKOV, L. Novaja tehnologija zimnej splotki. **[New techniques for bundle assembly in winter.]** *Lesn. Prom.* 1958 (9), (16–7). [Russ.]

The forms in which logs are assembled for bundling, as they are ejected from the conveyors, have vertical collapsible end-supports. After the logs have been bundled, the supports are lowered and the bundles dragged away for raft assembly. Output (i.e. timber dealt with) per 13-man gang per shift is 255 cu.m.

1902. VENCENOSCEV, JU. N., and SULHANOV, P. P. Opyt mehanizirovannoj zimnej splotki hlystov. **[A trial in mechanized bundling of tree-length logs in winter.]** *Lesn. Prom.* 1958 (10), (23–5). [Russ.]

Illustrates and describes a system of binding together 25-cu.m. bundles of tree-length logs to form compound bundles of 50 or 100 cu.m. TL-5 or L-20 winches are used in pairs. Bundles of 50 cu.m. were found to be superior to those of 100 cu.m.

1903. KOŽANOV, D. I. Gidravličeskij torceval'nyj stanok. **[A hydraulic bundle-trimmer.]** *Lesn. Prom.* 1958 (10), (25–7). [Russ.]

Projecting ends of logs in raft bundles snag on each other in rough water, sometimes causing the bundle fastenings to snap, or even the entire raft to break up. Accordingly, in 1957, a 25-ton, pontoon-mounted trimming machine to level the ends of bundles was installed in front of the main gates of the raft-assembly section of the Sokolsk Floating Depot, Nizhvyatsplav. The floating bundles pass singly into the machine between two hydraulically moved metal plates which close on the ends of the bundle, pressing any projecting log ends into a single plane with the rest. Hydraulic pressures of 65 kg./sq. cm. are used, the plunger diam. being 110 mm.; the plates move at 0·027 m./sec., and have a maximum separation of 9 m.; one plate can be operated at a time if required, and the average working cycle takes 120 sec. Output per [8-hr.] shift, assuming bundles of ca. 20 cu.m. each needing to be trimmed, is calculated at 4800 cu.m. In actual practice 3000 cu.m. are trimmed per shift, bundles not needing trimming being passed straight through the machine.

1904. SELIVANOV, P. A., and GONIK, A. A. Buksirovka plotov s bol'šoj osadkoj. **[Towing deep-draught rafts.]** *Lesn. Prom.* 1958 (9), (18–9). 1 ref. [Russ.]

A narrow raft, 2 sections wide, having a draught of 2·8 m., was towed across the Kuibyshev Reservoir by an 800-h.p. tug. Investigations were made of the reductions in towing speed caused by winds (and the resulting waves) of 2, 4, 6, . . . 14 m./sec., for head, head/side, side, side/tail, and tail winds. Results indicate that rafts 4 sections wide (total width 54 m.) and of 1·8–2 m. draught are far inferior to those 2 sections wide and of 2·8–3 m. draught, with which greater towing speeds can be achieved. In further experiments, a cigar-shaped raft, composed of 8 smaller cigar-shaped sections, was made (length 210, greatest width 27, draught 3·2 m.) and towed across the reservoir by a 530-h.p. tug at speeds equal to those attained by 800-h.p. tugs with 8 conventional 4-section rafts. In laboratory tests on scale models, the wave forces in tons on rafts 27, 18 and 9 m. wide and of 2 and 2·8 m. draught were determined for waves 1 m. high and 12 m. long, 1·4 and 13 m., 1·7 and 15 m., and 2 and 16 m., at towing speeds of 0 to 1·25 m./sec. These tests confirmed the advisability of using rafts $\geq$ 27 m. wide (2 sections; of deep draught) in spring and autumn operations on the Kuibyshev Reservoir.

38. Forest Engineering

383. Roads and Bridges

See also Nos. 1861, 1864, 1889, 2214–6.

1905. Sonderheft Waldwegebau. **[Special No.: Forest roadbuilding.]** *Forst- u. Holzw.* 13 (18), 1958 (355–73). [G.]

Includes articles on: The care and maintenance of gravel-layer roads bound with sand and water (*E. Volkert*); The use of heavy roadbuilding machinery for repair and maintenance of forest roads (*Rosenstock*); Rational roadbuilding (*G. Greiss*); Thoughts on present-day road-building problems (*Kiesekamp*); A simple method of stabilizing a main agricultural road (*Sommer*).

1906. Nestor, D., and Opriţa, V. Cercetări privitoare la tipurile de drumuri pentru autocamioane şi tractoare din pădurile R.P.R. **[Types of lorry and tractor roads in Rumanian forests.]** *Rev. Pădurilor* 1958 (6), (327–30). [Rum.russ.g.f.e.]

Gives tabulated data on (1) types of road and methods of construction, (2) technical characteristics (gradients, radius of curves, width, camber etc.) and costs per km., (3) maintenance costs for (*a*) lorry and (*b*) tractor roads.

1907. Novikov, G. N. Mehanizacija uhoda za ledjanymi dorogami. **[Mechanized care and maintenance of ice roads.]** *Lesn. Prom.* 1958 (9), (3–5). [Russ.]

Gives specifications of the Štarker vacuum-tank equipment [cf. *F.A.* 17 No. 1686; 20 No. 630]. Of 4 cu.m. capacity, it can be filled with water in 8–10 min. With the ZIL-150 lorry, the initial watering proceeds at ca. 8 km./hr. and at 18 km./hr. for subsequent waterings. Water is released in a stream 1·1 m. wide, to a total of 65 cu.m. per 8-hr. shift.

1908. Krempl, H. Die Verwendung von Wasserspulen auf Forstwegen im Gebirge. **[The use of open culverts on forest roads in the mountains.]** *Allg. Forstztg.* 69 (17/18), 1958 (223–9). 10 refs. [G.]

Summarizes a thesis, based largely on Austrian and Swiss practice, discussing spacing, direction to road axis, cross-sections, gradients, construction, materials (mostly wood and/or concrete, with metal clamps etc.), durability under traffic and decay, etc. Larch has proved the most durable wood among those commonly used.

384. Protective Works, including Torrent Training

See No. 1404.

385. Drainage, Irrigation, Sedimentation. Water Supply

See also No. 1861.

1909. Perry, D. J. **The construction of ditches by means of explosives.** *Roy. Engrs'. J.* 72 (3), 1958 (260–70).

Discusses the principles of ditch-blasting and its practical applications, based on Norwegian experience, with some indication of costs.

1910. Numminen, E. Tutkimus vuosina 1951–53 aurattujen metsäojien mitoista ja kunnosta. **[A study on the dimensions and condition of ploughed forest ditches.]** *Metsät. Aikak.* 1958 (8/9), (282–6). [Fi.e.]

Discusses [with illustrations] the condition of ditches that were ploughed 1–5 years earlier. Mean dimensions were: depth 57 cm., basal width 41 cm., top superficial width 135 cm., slope of sides 1/0·8. Factors affecting the dimensions are discussed. Large tractors should have tracks 30 in. wide to allow steady movement over wet land. *From author's summary.*

4. FOREST INJURIES AND PROTECTION

41. General Technique of Forest Protection. Types of Injury

See also Nos. 1861, 1874.

1911. **Review of the crop protection and pest control exhibition [London, 1958].** *World Crops* 10 (6), 1958 (201–8). O.R.E.

A description of equipment and chemicals, with special reference to sprayers.

1912. Edson, E. F. **The risk of pesticides to fish.** *World Crops* 10 (8), 1958 (281–3). O.R.E.

Discusses various insecticides, herbicides, oil and aromatic solvents, tabulating maximum upper safe limits for initial concentrations of pesticides. Endrin, toxaphene, dieldrin and aldrin are the most dangerous.

1913. Szczerbiński, W., and Szymański, S. Reakcja młodej sosny zwyczajnej *Pinus silvestris* L. na uszkodzenia mechaniczne o różnym nasileniu. **[The reaction of young *P. sylvestris* to varying degrees of mechanical damage.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (393–412). 12 refs. [Pol.russ.e.]

Seven-year Pines were intentionally damaged by (*a*) cutting off parts of the branches, (*b*) severing at the second whorl from the top, or (*c*) both. Observations were made in the 1953 and 1954 growing seasons. After (*a*), shoots were put out from dormant buds; after (*b*), the side shoots formed supplementary top shoots; (*c*) caused dormant buds to put out shoots, but was usually followed fairly soon by death of the tree.

1914. Linzon, S. N. **The effect of artificial defoliation of various ages of leaves upon White Pine growth.** *For. Chron.* 34 (1), 1958 (50–6). 6 refs.

Experiments on 7 pairs of 20-year-old trees (1 pair as control) indicated that the removal of any one year's needle growth reduced height growth and, to a lesser extent, diameter growth, in the current growing season. Removal of 2 years' needle growth increased this effect. When the foliage removed included the one-year-old needles, diameter growth almost ceased. Removing the current year's needles affected height growth more than diameter growth. Recovery in the following season varied.

42. Injuries from Inorganic Agencies other than Fire

See also Nos. 1495, 1990.

421. Air Currents

See Nos. 1541, 1643, 1876, 2121.

422. Temperature Influences. Frost. Heat. Drought

See also Nos. 1542–3, 1668, 1677, 1682, 1737, 2128.

1915. Zieger, E., Pelz, E., and Hornig, W. Ergebnisse einer Umfrage über Umfang und Art der Frostschäden des Winters 1955/56 in den Staatlichen Forstwirtschaftsbetrieben der DDR. **[Answers to a questionnaire on the extent and nature of the frost damage of the 1955–56 winter in the State forests of E. Germany.]** *Arch. Forstw.* 7 (4/5), 1958 (316–37). 12 refs. [G.g.russ.e.]

Between 1 Nov. 1955 and 31 Mar. 1956, the sum of the negative daily mean temperatures of the winter at Leipzig was − 405° C. and the days with − 10° or lower was 21. Corresponding figures for 1928–29 were − 502° and 13. The effect of the more recent winter is studied from the answers of > 250 forest districts to a questionnaire and compared with those of the earlier winter. The questions cover site conditions (dates with − 28° and − 20°, location of lowest temperature, altitude, aspect, topography, soil); stand conditions (age- and tree-classes most affected, effect of site and smoke damage, aspect of the worst damaged stand margin, age of shoots worst damaged, recuperation in the ensuing summer). Species reported on are Spruce, Scots Pine, Silver Fir, Larch, Douglas Fir (vars. *caesia*, *glauca*, and *viridis*), Lawson Cypress, Beech, Pedunculate, Sessile and Red Oaks, Birch, Alder, Ash, Sycamore and Norway Maples, and Poplars. The frost damage of the 1955–56 winter was marked most conspicuously by injury to evergreen conifer needles. There were few reports of damage to hardwoods. Spruce suffered severely within its natural range, Silver Fir very severely, and Pine to a limited extent.

1916. Ferré, Y. de. Effets du froid de février 1956 sur les plantes ligneuses dans la région toulousaine. **[Effects of the cold weather of February 1956 on woody plants in the Toulouse region.]** *Trav. Lab. for. Toulouse* 1 (5), Art. 32, 1957. pp. 10. [F.]

Temperatures ranged from + 13° C. on 29 Jan. to − 16° on 3 Feb., and went as low as − 19° on 15 Feb. Notes are given on injuries to a number of exotic species in gardens, arboreta, etc.

1917. Dupont, P. Les reboisements du nord-ouest de l'Espagne après les gelées de février 1956. **[The plantations in the N.W. of Spain after the frosts of February 1956.]** *Trav. Lab. for. Toulouse* 1 (5), Art. 33, 1957. pp. 6. 2 refs. [F.]

[Cf. *F.A.* 18 No. 2321.] Examination of the affected stands during the summer of 1956 indicated that Eucalypts had suffered less than had at first been feared. *Pinus radiata*, however, partly because it had been planted in the eastern part of the region, where temperatures as low as − 13° C. occurred, suffered more, some stands being completely destroyed; but elsewhere there had been considerable recovery. Future afforestation policy in the Basque region is discussed.

1918. Thomas, G. P., and Craig, H. M. **Winter injury and subsequent mortality to Douglas Fir.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (4), 1958 (3).

A total of 336 trees was examined in an area of British Columbia in which unusually great temperature differences occurred in the winter of 1951–52. Mortality, whether the result of direct killing by frost or the killing of frost-injured trees by *Dendroctonus pseudotsugae*, followed a consistent pattern, dominants and codominants having 60% dead, intermediate trees 20%, and overtopped trees 5%.

1919. Pourtet, J. Le dépérissement des peupliers dans le nord-est de la France au printemps 1958. **[The dieback of Poplars in N.E. France in spring 1958.]** *Rev. for. franç.* 10 (8/9), 1958 (521–5). [F.]

The severe dieback described was found to be mainly in *Populus* × *robusta* plantations > 20 years old, in regions with a predominantly continental climate, and situated in valley bottoms. It is ascribed to the severe frost of Feb. 1956 followed by unfavourable conditions (mild winters with late frosts) in 1957 and 1958.

1920. Lassalle, J. C. M. Efecto de las heladas en los *Eucaliptus camaldulensis* (*rostrata*) enviverados en el vivero forestal de Guatrache (La Pampa). **[Effect of frosts on *E. rostrata* growing in the forest nursery of Guatrache (La Pampa).]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 257–200, 1957. pp. 2. [Span.]

Notes on severe damage to 6-year-old plants by 16 days' frost in the winter of 1957.

1921. Barrett, D. K. **Cracking in the main stem of Noble Fir at Lethen, Nairnshire.** *Scot. For.* 12 (4), 1958 (187–90 + 2 plates).

An account of the examination of a large, wind-thrown *Abies procera* ca. 70 years old and ca. 120 in. g.b.h., which was found to contain numerous cracks that had developed periodically over 48 years. The cracks were found to have taken place at or near to the extreme edge of their annual rings, and comparison of these events with the meteorological data showed that they were equated with periods of very dry weather accompanied by high temperatures. The small proportion of late wood which is generally characteristic of the wood of drought-cracked trees is thought to be caused by the early cessation of radial extension, due to environmental conditions. [Cf. *F.A.* 16 No. 589.] *From author's summary.*

424. Soil Conditions. Erosion Effects. Nutrient Deficiencies etc.

1922. Richter, H. Bilanz eines Katastrophensommers. **[A summer of [flood] disasters.]** *Holz-Kurier, Wien* 13 (46), 1958 (5–6). [G.]

A brief analysis of the disasters in 1958, when 400 mm. of rain fell in 12 hours in Styria, causing whole stands of shallow-rooted Spruce to slide down the mountain side, and 60 mm. in a single hour in

Carinthia. No blame is thought to lie with forestry practices in Styria, and only a little with earlier deforestation in Carinthia, but whereas on 3 torrents that had been trained, damage by mud avalanches was small, on all others, where training had been prevented by lack of funds, it was heavy.

1923. BUDYKA, S. H., KUPREJČIK, A. F., and MAKAREVIČ, V. S. Vlijanie podtoplenija na rost lesa. **[The influence of waterlogging on forest growth.]** *Sbornik Naučnyh Rabot po Lesnomu Hozjajstvu BSSR* No. 7, 1956 (178–202). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (3), (No. 10563). [Russ.] H.S.B.

Sample plots were established near the Berezina and Zelvyanka rivers, Belorussia, in a zone that became waterlogged when new dams were built. Where the water-table was raised considerably over 4 m. the increment of 40- to 60-year Pine decreased, while Birch of the same age proved more resistant. Diameter increment of 20- to 50-year Alder improved when the water-table lay at 0·15–0·8 m. but decreased when it rose to 0·10 m. A sharp decrease occurred in the diam. increment of 20- to 60-year Spruce on the lower-lying ground. No change was observed in the increment of Oak where the water-table was lower than 0·7 m.

1924. TERENT'EVA, N. L. O pričinah pojavlenija fioletovoj okraski hvoi u sosnovyh sejancev. **[On the reasons for the appearance of violet colouring on needles of Scots Pine seedlings.]** *Bjulleten' naučno-tehničeskoj Informacii, UkrNIILHA, Har'kov* No. 1, 1956 (26–7). [Russ.]

Trials showed the phenomenon to be due to lack of P in the nursery soils.

1925. HOLSTENER-JØRGENSEN, H. Magnesium-mangel hos rødgran i en plantskole. **[Magnesium deficiency of Norway Spruce in a nursery.]** *Dansk Skovforen. Tidsskr.* 43 (10), 1958 (488–94). 4 refs. [Dan.e.*e.*]

Analyses of soils in the Egelund nursery showed that the content of exchangeable Mg increased with increasing pH. Five plots, with trees showing Mg deficiency, and pH values round the critical level of 5, were treated in Dec. 1956 or April 1957 with various combinations of N (500 kg. $Ca(NO_3)_2$/ha.), P (1000 kg. superphosphate), K (500 kg. K_2SO_4) and Mg (1000 kg. $MgSO_4$). Examination in Oct. 1957 showed that the number of trees with deficiency symptoms was reduced by treatments that included Mg but increased by application of K without Mg. Addition of P and K but not of Mg affected the soil-analysis values. A negative correlation was found between T_{Mg}/T_K and the number of plants with Mg deficiency in the individual beds. Serious Mg deficiency may give fewer surviving plants per bed and shorter top shoots, but the differences were not significant. It is concluded that a pH of 5·5–6 should be maintained and that K should not be over-applied.

1926. VOIGT, G. K., STOECKELER, J. H., and WILDE, S. A. **Response of coniferous seedlings to soil applications of calcium and magnesium fertilizers.** *Proc. Soil Sci. Soc. Amer.* 22 (4), 1958 (343–5). 14 refs. O.R.E.

Coniferous seedlings and transplants growing in two nurseries on coarse sandy soils in N. Wisconsin showed intense yellowing of the outer parts of the needles, or of all parts, accompanied by a reduction in growth. Trials traced the yellowing to acute deficiency of available Mg and Ca. Soil and foliage analyses suggested antagonistic relationships between Ca and Mg and K. The normal colour and rate of growth were restored by applying 1 ton of dolomitic limestone per acre, or by working in a 6-in. top-dressing of leafmould from a hardwood/Hemlock stand. *From authors' summary.*

1927. KNIGHT, H. A. W. **Treatment of chlorotic Ponderosa Pine seedlings [with iron chelates and NH_4NO_3 and $(NH_4)_2SO_4$].** *For. Res. Rev. B.C. For. Serv. 1957/58*, 1958 (34).

The following treatments were tested on 4 × 4-ft. plots of chlorotic 1 + 0 Ponderosa Pine seedlings in East Kootenay Forest Nursery: (1) Sequestrene 330 FeO, (2) Sequestrene NaFe, (3) Sequestrene 153 Fe, (4) Versenol, (all in 0·3 and 0·6% solutions, at 88 and 176 lb./acre), (5) Versenol and vermiculite (150 and 300 lb./acre), (6) NH_4NO_3 (200 lb./acre), (7) $(NH_4)_2SO_4$, and (8) control. While none of the chelate treatments (1)–(5) was definitely superior to any other, (5) took effect most rapidly; all produced an improvement in seedling colour, but improvement in top growth was not definitely established. Treatments (6) and (7) were much inferior to (1)–(5). [Cf. *F.A.* 18 No. 547.]

425. Chemical Influences (Atmospheric)

See also No. 1915.

1928. HÄRTEL, O. Zur Trennung der Schadanteile gleichzeitig auf die Vegetation einwirkender Abgasquellen. **[Apportioning responsibility for damage to vegetation between two or more sources of atmospheric pollution operating simultaneously.]** *Allg. Forstzeitschr.* 13 (42), 1958 (598–600). 1 ref. [G.]

Discusses, with two practical examples of cumulative S damage to Spruce, methods used, including comparisons of air pollution, S content of needles, turbidity tests, visible-injury rating in 5 severity-classes of increment reduction, analysis of prevailing winds at various heights, topography etc.

1929. WENTZEL, K. F. Über die Regelung eines Rauchschadenfalles in der Praxis. **[Settlement of an actual smoke-damage case.]** *Allg. Forstzeitschr.* 13 (42), 1958 (606–13). 13 refs. [G.g.]

Reports an individual case where analysis of wind direction, area of visual damage, and analysis of leaves from 15 sample trees (Beech) proved that F compounds emanating from the low chimney of a brickworks were responsible for the injuries to mixed Beech/Oak stands with some Pine. Compensation was based on losses from premature felling and from reduced increment. Erection of a high chimney greatly reduced the damage.

1930. PELZ, E. Beobachtungen zur Rauchhärte der Kiefer. **[The smoke hardiness of Pines.]** *Allg. Forstzeitschr.* 13 (42), 1958 (603–6). 9 refs. [G.g.]

Observations in Brandenburg indicate that, on nutrient-deficient sites, poor stands of Scots Pine

may be highly susceptible to S damage, with serious injuries at S levels of < 25 mg./100 hours. *Pinus strobus*, observed in the Erzgebirge, was hardier, growing well and free from rust where *P. sylvestris* was injured. *P. nigra* proved hardiest. Individuals of *P. sylvestris* resistant to smoke had darker and thicker needles forming a greater angle with the shoot than those on injured trees in the same stand.

1931. HARRISON, W. C., and HENDRIX, J. W. **Influence of soil types on the response of Ponderosa Pine to atmospheric fluorides.** *Abstr.* in *Phytopathology* 48 (8), 1958 (393).

Sensitivity to F pollution among 3-year-old plants grown near Mead, Washington, on 8 different soils, varied considerably in terms of % of needles scorched and % of total needle length scorched. Plants grown on soils of medium porosity appeared to be less resistant than plants grown on soils with very large or very small particles.

1932. NĚMEC, A. Studie o kouřových škodách na lesních porostech v okolí papíren v České Kamenici. [**Smoke damage to forest plantations in the neighbourhood of paper mills near Česká Kamenica.**] *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 3 (1), 1957 (33–58). 5 refs. [Cz.cz.russ.g.]

In the neighbourhood of a paper mill at Horní Prysk, trees have been injured and killed by SO_2 fumes. Trees on soils over sandstone (*a*) were much less resistant to injury than trees on richer soils over phonolite (*b*); the injured leaves of (*a*) showed SO_3 contents nearly twice those of the uninjured leaves of (*b*), though the latter also were relatively high. Attempts were made in spring 1953 to improve the resistance of young trees planted on poor sandstone soils by (1) adding ground basalt (3 kg./planting hole, at time of planting) and serpentine (1 kg./plant, in the next spring), and (2), as (1), plus mulching at planting time with a 30-cm. layer of heather. Measurements of height growth up to 1955 (the plots were damaged by deer in 1956) showed a marked response of Alder (*Alnus glutinosa*) to both treatments, especially (2); Elm, the most smoke-resistant of the species studied, reacted favourably to (2), but not to (1); Maple showed little response, and Lime none, to either treatment; Beech responded very little, and only to (2); Hornbean responded well, equally to (1) and (2); and Oak (*Quercus robur*) was beginning to respond to (2) only. Both treatments reduced smoke injuries (rated by visible foliar symptoms) in all species studied. Leaf analyses were made for mineral constituents (Alder, Oak), total and reducing sugars (the same, plus Elm), and chlorophyll (the same, plus Beech and Hornbeam). The treatments caused a considerable reduction of the SiO_2 and SO_3 contents in Alder and Oak, with a simultaneous increase of Mg in the former and of Ca and K in the latter. In general, both treatments increased the content of sugar, especially reducing sugars, in Alder, Oak and Elm, the effect of (1) being more marked than that of (2). Chlorophyll contents were raised by 10–20%, in all species analysed, by treatment (2) [no figures quoted for (1)].

1933. NĚMEC, A. Vliv kouře a popílku na intoxicaci smrkových porostů. [**The toxic effect of smoke and airborne ash on Spruce stands.**] *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (5), 1958 (397–420 + 9 plates). [Cz.cz.russ.g.]

Describes the severe damage to Spruce stands in Starkov Forest, Czechoslovakia, for a radius of 3–4 km. round a power plant burning coal with an S content of 7–8%. Spectrographic and polarographic analyses of the needles and wood of the branches of damaged and dying Spruce indicated surprisingly high contents of elements found in the ash, notably Pb, Zn and Cu. It is thought that, besides the direct harm done to the assimilating organs by the SO_2 in the smoke, the increased concentration of heavy metals in the soil due to airborne ash, and their uptake by the trees, also have a harmful effect.

1934. DEROJAN, G. V. Sostojanie drevesnyh nasaždenij v promyšlennom centre v svjazi s zagrjazneniem ego atmosfery. [**The condition of tree plantings in an industrial centre in relation to air pollution.**] *Izvestija Akademii Nauk Armjanskoj SSR, Biologičeskie i Sel'skohozjajstvennye Nauki* 10 (5), 1957 (57–64). [Russ.arm.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (3), (No. 10569). [Russ.] H.S.B.

The concentration in the air of SO_2, N oxides, and H_2SO_4 fumes discharged in excessive amounts by non-ferrous metal foundries at Alaverdi (altitude 1000 m.), Armenia, is tabulated by zones. Soil samples taken near the works showed abnormal amounts of Cu, Zn and Pb. Susceptibility to this type of pollution decreased in the order [shrubs and fruit trees omitted] *Acer negundo*, *Fraxinus excelsior*, *F. pennsylvanica*, *Quercus macranthera*, *Juglans regia*, *Robinia pseudoacacia*, *Ailanthus* [*altissima*?]. Oak stands of seed origin appear to be more resistant than plantations.

1935. RHODES, H. L. J. **The columnar form of the Western Red Cedar—an environmental modification.** *Canadian Field Naturalist, Ottawa* 69 (3), 1955 (1956), (132–3). B.A.P.

The columnar form of *Thuja plicata* reported in 1948 at Kilgard, B.C., is thought to be a deformity produced by clay dust from neighbouring brickworks.

426. Electrical and Cosmic Influences

See Nos. 1938–9.

43. Forest Fires

See also No. 1413.

1936. **Second national forest fire research conference.** *Pulp Paper Mag. Can.* 59 (9), 1958 (168 . . . 207).

Contains notes on discussions and demonstrations, and summaries and complete papers on fire protection. A radio-communications symposium of three papers (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1775 (*F*-3)) deals with radio control in fire fighting.

1937. MACDOUGALL, F. **Reporting forest fires.** *Pulp Paper Mag. Can.* 59 (9), 1958 (206–7).

431. Predisposing Factors and Causes. Fire Danger. Fire Behaviour

1938. BARROWS, J. S., *et al.* **Project Skyfire.** *Repr.* from *Final Report of the Advisory Committee on Weather Control.* [U.S. Government Printing Office, Washington]. 1958. pp. 105–25. 19 refs.

Summarizes research carried out at U.S. forest research stations on the origin and behaviour of lightning-caused fires and the possibility of preventing them by cloud seeding etc. [cf. *F.A.* 18 No. 4185.].

1939. FUQUAY, D. M., and WELLS, H. J. **The Project Skyfire cloud-seeding generator.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 48, 1957. pp. 17.

Describes, with instructions for installing and operating, a generator designed to produce AgI nuclei for experiments in lightning suppression.

1940. LOOMIS, R. M., and STEPHENS, V. **Fan psychrometer.** *Fire Control Notes* 19 (4), 1958 (136–7).

Describes a fan psychrometer for measuring relative humidity at fire-danger stations where 110- to 120-volt, 60-cycle A.C. is available. This type of instrument, now in use in the Missouri National Forests, is proving satisfactory.

1941. EDLIN, H. L. **Forest fires: what burns and when?** *Quart. J. For.* 52 (4), 1958 (299–304).

Discusses ground flora, shrubs, coniferous trees, broadleaved trees and peat from the point of view of the amount of fuel they contribute to forest fires and their degree of inflammability at various seasons of the year in Great Britain.

1942. DIAS, A. BELLO. Como calcular o risco momentâneo de incêndio na floresta. **[How can current fire danger be calculated in the forest?]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 88-*E*6, 1958. pp. 16 + 15 tbls. 4 refs. [Port.] Limited distribution.

The fire-danger tables of H. W. Beall used by the Canadian Forest Service [cf. *F.A.* 8 No. 1384] are adapted to *Pinus pinaster* under Portuguese conditions.

1943. DIAS, A. BELLO. Risco permanente de incêndio no Patrimônio Florestal. **[Permanent fire risk in the national forests.]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 92-*E*6, 1958. pp. 3 + 6 tbls. [Port.] Limited distribution.

Using as a basis Seigne's concept of R (mean fraction of total forest area burnt annually) [cf. *F.A.* 17 No. 4063] fire-risk tables are drawn up for 6 forest areas of Portugal.

1944. MORRIS, W. G. **Slash fire behaviour correlates with fuel moisture indicator stick readings.** *Timberman* 59 (10), 1958 (59–60). 1 ref.

An extension of a previous study [cf. *F.A.* 15 No. 366], covering 1949–57, deals with slash burns set in clear-felled areas (mainly Douglas Fir type), in fair weather, at least 2 days after rain. The moisture contents (m.c.) of sticks exposed in (*a*) the slash and (*b*) neighbouring green timber, averaged respectively: for 77 slow fires that had to be lit from place to place, 16·6 and 22·2%; for 55 readily spreading fires that did not 'spot' outside the slash, 14·2 and 20·2%; for 39 rapidly spreading fires that spotted, usually into (*b*), 13·8 and 18·5%. The difference between the 14·2 and 16·6 means in slash was highly significant and was the only significant difference. Exposure to sun, steepness of slope, wind speed, and dryness of duff were only slightly greater in the spotting fires. The % area burned through both litter and duff to the mineral soil for the 3 fire types was 19, 35 and 39. The following rules are derived from these results: burn in autumn when rain has moistened the bottom of the duff layer, more than one day after rain, not with an east wind, and with the moisture sticks showing ca. 14 and 20% m.c. in (*a*) and (*b*) respectively.

432. Prevention and Control

See also No. 1861.

1945. **Battelle study divides fire control costs by formula.** *Timberman* 59 (10), 1958 (79). 1 ref.

A note outlining the Battelle Memorial Institute report (*A study of the co-operative forest fire control problems*) gives the following conclusions: the justifiable annual costs of the Clarke-McNary co-operative fire-control programme, including the cost of prevention, pre-suppression and suppression are estimated at $60 million, based on timber saved alone. It is believed that additional programme expenditure of 25–30% is justified to prevent damage to water and recreation resources. On the basis of the two criteria of responsibility for fire risk and interest in loss reduction, it is estimated that private, state and federal shares should be ≮ 16 : 25–44 : 59–40%, the actual figures depending on the conditions of the region concerned.

1946. WILLIAMS, R. L. Informe al gobierno de Venezuela sobre la prevención y extinción de incendios. **[Report to the government of Venezuela on the prevention and control of fires.]** Expanded Technical Assistance Program, FAO, Rome. *FAO Report* No. 847, 1958. pp. 22. [Span.] Limited distribution.

1947. **Fighting forest fires with photographs.** *Canada Lumberman, Toronto* July 1957 (46). From *abstr.* in *For. Fire Prot. Abstr. For. Br. Can.* 8 (2), 1957 (75).

A new fire-detection and reporting system for mountainous country is used by the Eastern Rockies Forest Conservation Board in Alberta. Panoramic photographs of the terrain seen from each tower are given to the look-out man and to the superintendent concerned with the area. Each set consists of 12 numbered photographs mounted on aluminium sheets. In the upper left and right corners are scales from the centres of which plastic arms rotate across the photograph. When a fire is spotted, the look-out man selects the appropriate photograph, crosses the two arms on the exact spot of the fire, and reports the readings from the left and right scales to the superintendent.

1948. GAYLE, W. B. **What's in a fire pump.** *B.C. Lumberm.* 42 (9) 1958 (26, 28).

Discusses practical principles, and likely engines (auto and out-board and gas-turbine) etc. and

concludes that all requirements on the fire line would be met by three pumps: (1) A high-powered multi-stage centrifugal pump with a shifting device to put the stages (*a*) in parallel, to deliver 200 gal./min. at 30 lb. pressure for filling tanks or pumping along the level, or (*b*) in series, to deliver 10 gal./min. at 600 lb. for raising water; weight ⩾ 90 lb. (2-man load). (2) A low-powered pump weighing ⩾ 35 lb., producing 8–12 gal./min. at pressures ⩽ 350 lb., for use with 300-gal. metal tanks on cold decks or wherever water supplies are limited. (3) A pump capable of pumping the abrasive slurry of 'Firebrake' [cf. *F.A.* 18 No. 4187] with ⩽ 400 ft. head. Hose is now made to withstand 600 lb. pressure and can be made for 900 lb.

1949. West, R. M., and Steele, R. W. **Fireline trencher attachment for power saws.** *Fire Control Notes* 19 (4), 1958 (130–2).

The trencher consists of two spiral augers mounted on a horizontal shaft at the end of a standard chain-saw blade; the teeth of the chain turn the augers via a sprocket in the centre of the shaft. The trencher will make a trench 1 ft. wide, the depth being varied by raising or lowering the handle of the power-saw motor.

435. Benefits of Fire Control. Injurious Effects of Fire

See also Nos. 1999–2000.

1950. Trapnell, C. G. **The effects of fire in *Brachystegia-Isoberlinia* woodlands (Northern Rhodesia).** *Rep. E. Afr. Agric. For. Res. Organ. 1957*, 1958 (55–6).

Burning experiments in these woodlands have been maintained continuously since 1933, the three treatments being (*a*) a late or hot burn at the end of the dry season, (*b*) an early or cool burn, and (*c*) complete protection. The treatments were applied to standing woodland and to regeneration after clear felling. Contrary to accepted beliefs, the main canopy dominants of the genera *Brachystegia* and *Isoberlinia* were found to be fire-tender, the species involved being *B. spiciformis*, *B. longifolia*, *I. paniculata* and *I. tomentosa*. Full fire tolerance was established in only 3 of the canopy associates, *Parinari curatellifolia*, *Erythrophleum africanum* and *Pterocarpus angolensis*. On the other hand, the understorey and small-tree and shrub components were shown to contain a large number of tolerant or semi-tolerant species. In general it would seem that these woodlands can be regarded as a fire-induced type only in respect of their lower-layer components, and that they can in fact be destroyed by sufficiently repeated late burning. The effects of these treatments on the topsoil of the woodland plots were also investigated. The pH, exchangeable bases and P status were raised by (*a*) and (*b*) compared with (*c*), and this was more marked on (*a*) plots. Exchangeable Ca was highest under (*b*). Neither (*a*) nor (*b*) affected the organic-matter or organic-N content of the surface soil, probably because of termite activity in (*b*) and (*c*) plots. However, burning, and repeated late burning in particular, increase the liability of the surface soil to erosion in regions with a torrential one-season rainfall, owing to the destruction of the ground vegetation.

1951. Schmitz, A. Degradations consécutives aux feux sauvages dans le Haut Katanga—remèdes apportés. **[Progressive degradation due to wild fires in Upper Katanga, and remedies applied.]** *Bull. agric. Congo belge* 49 (4), 1958 (1031–8). [F.du.]

Compares early and late burning, complete protection and protection after the inevitable accidental fire (dry forest); and describes wild-fire effects on vegetation types and species (ecotone, semi-deciduous dense/dry forest) and the use of fire in seedbed preparation and, by early burning, for protecting young plants. Of the Pines used, viz. *Pinus khasya*, *P. palustris*, *P. pseudostrobus* and *P. leiophylla*, the last two suffer damage when resin exudations ignite.

436. Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry

See also Nos. 1385, 1950–1.

1952. Bentley, J. R., and Fenner, R. L. **Soil temperatures during burning related to postfire seedbeds on woodland range.** *J. For.* 56 (10), 1958 (737–40). 3 refs.

Fusion pyrometers [cf. *F.A.* 17 No. 3575] were constructed, consisting of a mica plate on which were painted 10 different fusible compounds, the specific melting points of which ranged from 150 to 1150° F. Placed in the soil, these proved satisfactory for measuring soil temperatures during burning of different fuel types, though a large number of individual measurements needed to be made. Seedbed suitability was shown to be closely related to soil temperatures during burning. A classification for brush burns into the following heads is proposed: surface-char seedbed; soil-char seedbed; soil-incineration seedbed.

44. Damage by Harmful Plants. Virus Diseases

441. Weeds

See also Nos. 1701, 1740–5, 1794, 1821, 1911–2.

1953. McCreath, J. B., and Forrest, J. D. **Bracken control machinery trials—West Perthshire 1952–55.** *Research Bulletin, West of Scotland College of Agriculture, Glasgow* No. 24, 1958. pp. 31. 6 refs. From *abstr.* in *Weed Abstr.* 7 (10), 1958 (1722). O.R.E.

The comparative costs per acre for 3 seasons of double treatment plus 1 season of single treatment were: Holt Breaker 47*s.*, Cuthbertson Crusher 61*s.*, Henderson Slasher 59*s.*, and Ferguson Mower 82*s.* Bracken recovery was more rapid after breaking than after cutting, and thus the Henderson Slasher may be as economical as the Holt Breaker or more so. The cutters reduced the height and density of the bracken more than the bruisers. Bracken control appears to be economically profitable.

1954. Shiue, C.-J., and Hansen, H. L. **Some anatomical responses of conifer needles to 3-amino-1,-2,4-triazole.** *Hormolog, Ambler, Pa.* 2 (1), 1958 (9–10). 4 refs. From *abstr.* in *Weed Abstr.* 7 (8), 1958 (1367). O.R.E.

Young trees of *Pinus resinosa* and *Picea glauca* were drenched with a 0·25% spray of aminotriazole in September; in the following June leaves were harvested, fixed in Zirkle's fixative, sectioned and stained with safranin O and fast green. The resulting changes in leaf anatomy are described and illustrated by 4 photographs. The tissues in the treated sections appear to be generally less clearly defined; however, the main difference is the absence of chlorophyll. Non-pigmented granular structures are present in the mesophyll and it is suggested these may be proplastids.

1955. McLURKIN, D. C. **Maleic hydrazide fails to control fertilized Bermudagrass.** *Tree Plant. Notes* No. 33, 1958 (29).

In a recent study at Oxford, Miss., using large quantities of commercial fertilizers in an attempt to improve survival and height growth of *Pinus taeda* seedlings on adverse sites, maleic hydrazide was applied to the weeds (mainly *Cynodon dactylon*), since excessive weed growth was probable. It had no apparent inhibiting influence on the grass, whose growth was well in excess of normal, smothering many seedlings on fertilized plots.

1956. MAGERAT, A. Considérations sur le débroussaillement sylvicole à l'aide de produits chimiques. **[Chemical control of forest weeds.]** *Bull. Soc. for. Belg.* 65 (10), 1958 (663–7). [F.]

On the basis of experiments in 1954–57 in Belgium the author indicates resistant coniferous species, suitable dates and weather, dosages and costs, for spraying plantations for the control of coppice regrowth and herbaceous weeds, using different mixtures and concentrations of 2,4-D and 2,4,5-T.

1957. ULRICH, A. T. **Experience gained from the application of a combined preparation of 2,4-D and 2,4,5-T esters for coppice conversion.** *Höfchen-Briefe, Leverkusen & Höfchen (English Ed.)* No. 5, 1956 (280–5). 39 refs. O.R.E.

Esters of 2,4-D (1 part) and 2,4,5-T (2 parts) in diesel-oil emulsion were used to kill unwanted coppice shoots in Oak and other hardwoods in coppice conversion areas at Chauseehaus near Wiesbaden. Basal stem sprays were applied by portable atomizer to 8-year-old coppice shoots. A 90% kill was obtained. The few Spruce on the area showed some resistance. The cost was ca. DM.450/ha., which compares well with the cost of cutting and clearance, and the saving in labour is considerable. Unwanted foliage and woody material decomposed very rapidly.

1958. EGLĪTE, A., and ZĪLE, M. Koku un krūmu apkarošana ar 2,4-D un 2,4,5-T natrija sāļiem. **[Destroying trees and shrubs with 2,4,-D and 2,4,5-T Na salts.]** *Latvijas PSR Zinātņu Akademijas Vēstis, Riga* No. 3, 1957 (69–76). 5 refs. [Latv.russ.] N.L.L.

Trials to eliminate *Alnus* spp., *Betula* sp., *Corylus* sp. and *Salix* spp. by spraying with a water solution of 2,4-D have shown that for plants up to 2 m. high, a first dose of 2–3 kg./ha. suffices (except *Salix* spp., 3–4 kg./ha.). With tractor- and horse-drawn sprayers, and knapsack sprayers, rates of 500–1000 litres/ha. are required, using 0·3–0·7% solution of 2,4-D, with aerial spraying 100–200 litres/ha. and 2%. Ca. 70–100% of the plants are killed at the first application, any survivors succumbing to a second dose of 1–2 kg./ha. Taller plants need heavier dosages. Best results are obtained by spraying in June, and treatment should not be attempted at temperatures $< 15°$ C. Generally, 2,4,5-T had the same effect as 2,4-D on *Betula* and *Salix*, but slightly less on *Alnus*. The addition of a surfactant OP-10 improved the effect of both herbicides. *Juniperus communis*, *Fraxinus excelsior*, *Picea abies* and *Berberis vulgaris* were completely resistant to 2,4-D and 2,4,5-T, while *Pinus sylvestris*, *Rhamnus* sp., *Populus tremula*, *Quercus robur*, *Larix* sp., *Malus* sp., *Tilia cordata*, *Sorbus aucuparia* and *Rubus* sp. could be killed only after repeated applications. In Ash and Spruce plantations, 2,4-D could thus be used to kill *Alnus*, *Betula*, *Corylus* and *Salix*, but to do this job in Pine plantations surfactant-free solutions at dosages $\geq 1·5$ kg./ha. applied in August only, should be used.

1959. **Scrub control by chemical means.** *World Crops* 10 (8), 1958 (289–90). O.R.E.

Includes a table of woody weed species controllable by a 2/1 mixture of 2,4-D and 2,4,5-T of 70% active principle (7 lb./gal.), in water for foliage, in oil for bark sprays, methods and times of application, dosage etc. For stump treatment, a 1/40 mixture of [this?] arboricide and oil is recommended, particularly for gorse.

1960. HILTON, H. F. **Effective chemicals—good application: the keys to brush control.** *Proc. 14th ann. Nth. Cent. Weed Control Conf.* 1957 (16–7). From *abstr.* in *Weed Abstr.* 7 (6), 1958 (931). O.R.E.

Basal applications to brush of 2,4,5-T in oil at least 2 weeks before cutting gave better results than stump applications after cutting.

1961. WILTSE, M. G., *et al.* **Comparisons of commercial herbicides for brush control on power-line rights-of-way.** *Proc. 12th Ntheast. Weed Control Conf.* 1958 (201–12). 3 refs. From *abstr.* in *Weed Abstr.* 7 (9), 1958 (1513). O.R.E.

Gives detailed results of a trial in which an area of mixed brush regrowth was sprayed with the following: 2,4,5-T (ester) 2 lb. acid equivalent/100 gal. (in oil/water emulsion), 4 lb./100 gal. (in water), or 16 lb./100 gal. (in oil, basal spray); 2,4,5-T (ester)/2,4-D (ester) both at 2 lb./100 gal. (in water and in oil/water emulsion); 2,4,5-T (amine) 4 and 16 lb./100 gal. (in water); and 2,4,5-TP (ester) 4 lb./100 gal. The esters used were always the propylene glycol butyl ether esters. The brush consisted primarily of the following: *Quercus alba*, *Q. borealis*, *Q. montana*, *Acer rubrum*, *Robinia pseudoacacia*, *Sassafras albidum*, *Betula lutea*, *Prunus serotina*, *P. virginiana*, *Cornus florida*, *Castanea dentata*, *Carya* spp., *Hamamelis virginiana*, *Ulmus americana*, *U. rubra*, *Ailanthus altissima*, *Fraxinus americana*, *F. pennsylvanica*, *F. nigra*, *Liriodendron tulipifera* and *Nyssa sylvatica*. Most species were 6–8 ft. high and some *R. pseudoacacia* and *L. tulipifera* 15–20 ft. high. Final observation was made ca. 14½ months after treatment. 2,4,5-T (amine), 16 lb. in water, was

much the most effective, giving a complete kill of 90% of all the treated trees and top killing of the remainder and giving excellent control of *Quercus* spp., *A. rubrum*, *Fraxinus* spp., *Ulmus* spp. and *N. sylvatica*. At only 4 lb./100 gal., the amine gave very good control of *Prunus* spp. The oil basal treatment with the ester gave excellent control of *Quercus* spp., *A. rubrum*, *R. pseudoacacia* and *N. sylvatica*, quite good control of *Carya* spp., but only poor control of *Fraxinus*, *Prunus*, and *Ulmus* spp. The 2,4,5-T/2,4-D mixture in water gave 100% control of *Prunus* spp. and *N. sylvatica*, and in the oil/water emulsion gave 100% control of *Carya* spp. (complete top kill and only 17% regrowth). Oil/water emulsions in general gave good top kill, but coppicing was greater than from water sprays. 2,4,5-TP was more effective against *Quercus* spp. and *R. pseudoacacia* than 2,4,5-T (ester) or the 2,4,5-T/2,4-D mixture.

1962. COULTER, L. L., **Right-of-way brush control research and its ramifications**. *Proc. 12th Ntheast. Weed Control Conf.* 1958 (213–9). From *abstr.* in *Weed Abstr.* 7 (9), 1958 (1514). O.R.E.

In a trial in which 2,4,5-T (ester) 4 lb./100 gal. was applied to *Cornus stolonifera* and *Fraxinus americana*, with and without prior removal of leaves, *F. americana* was killed with, but unaffected without, its foliage. *C. stolonifera* were killed in both cases, but when only the tops were sprayed, most of them coppiced from the root collar especially if the leaves had been removed before treatment.

1963. BYRNES, W. R., BRAMBLE, W. C., and HUTNIK, R. J. **Effect of volume of spray upon top kill and resurge [sprouting] of Oak-Maple brush**. *Proc. 12th Ntheast. Weed Control Conf.* 1958 (230–8). 5 refs. From *abstr.* in *Weed Abstr.* 7 (9), 1958 (1515). O.R.E.

A 1/1 mixture of butoxy ethanol esters of 2,4-D and 2,4,5-T containing 4 lb. acid equivalent was applied as a stem-foliage spray to mixed brush regrowth averaging 8 ft. in height and 43% in ground density, at volumes of 100, 200, 300 and 400 gal./acre, very little coverage of stems and inner foliage being obtained with the 100-gal. rate. After two growing seasons the % top kill of all species was respectively 61 (for 100 gal.), 74, 86, and 84; for Oaks (mainly Chestnut Oak) 65, 74, 85 and 83; for Red Maple 45, 74, 89 and 87; and for other hardwoods 50, 100, 100 and 100. The %s of top kill not resprouting for the 4 treatments were 79, 85, 88 and 91 respectively. Only about $\frac{1}{4}$ of the coppice after top kill was alive in all 4 treatment areas, the % of plants surviving after two seasons (expressed as % of plants present before treatment) being Oak 41, 28, 17, 19; Red Maple 58, 36, 22, 19; and other hardwoods 50, 0, 0, 8. The %s of ground cover killed 8 weeks after spraying were respectively: 20, 38, 65 and 70, the dominant species most severely damaged being Blueberry [*Vaccinium angustifolium*], Huckleberry [*Gaylussacia* sp.], sweet fern [*Myrica asplenifolia*] and loosestrife [*Lysimachia* sp.]. Sedges and grasses suffered little. One year after treatment the %s of ground cover were as follows (with the % before treatment in parenthesis): 78 (71), 70 (64), 38 (61), and 35 (61).

1964. HODGDON, A. R. **Vegetational survival on some public utility lines in New Hampshire following foliage spraying with 2,4-D and 2,4,5-T esters**. *Proc. 12th Ntheast. Weed Control Conf.* 1958 (239–45). 1 ref. From *abstr.* in *Weed Abstr.* 7 (9), 1958 (1516). O.R.E.

Foliage spraying with a 1/1 mixture of 2,4-D and 2,4,5-T 4 lb./100 gal. gave high % kill of *Quercus alba*, *Q. rubra* and *Q. velutina* and pronounced growth suppression and top kill of *Acer rubrum* in 3 areas that had been cleared $2\frac{1}{2}$–3 years earlier. Of the shrub species, *Alnus rugosa*, *Salix discolor*, *S. humilis*, *Rhus glabra* and *R. typhina* were mostly killed; *Ilex verticillata* and *Vaccinium corymbosum* suffered considerable stem damage and were often killed; and the following showed resistance in varying degrees: *Comptonia peregrina*, *Vaccinium angustifolium*, *Spiraea latifolia*, *Viburnum acerifolium*, *Diervilla lonicera*, *Kalmia angustifolia*, and *Gaylussacia baccata*. The herbaceous vegetation showed an increase in abundance in all 3 areas and also (in 2 areas) in the number of species.

1965. HANSEN, H. L. [Editor]. **Control of brush in forests, tree plantations and farm woodlands**. *Res. Rep. 13th ann. Nth. Cent. Weed Control Conf.* 1956 (166–8). From *abstr.* in *Weed Abstr.* 7 (3), 1958 (420). O.R.E.

Various methods of killing trees were compared. The man-hours required increased in the order: power girdling, basal spraying, Na arsenite applied by the Cornell tool, girdling by axe plus spray, inserting Na arsenite tabs under the bark with a special tool. Monuron and MeBr killed roots of Pin Oak (*Quercus ellipsoidalis*) thus preventing migration of the Oak wilt fungus. Various chemicals were tested for weed control in firebreaks and wood storage yards. A 90–100% kill of *Alnus glutinosa* was obtained by a basal spray of 2–3% 2,4-D + 2,4,5-T (2/1) in diesel oil, applied when the buds were bursting in the spring.

1966. **Weeds**. *Crops & Solis*, *Madison* 10 (9), 1958 (38–9). From *abstr.* in *Weed Abstr.* 7 (10), 1958 (1683). O.R.E.

Includes a report on the successful use of pelleted fenuron at 16 lb./acre applied in the spring when trees are first beginning growth, for the control of Post Oak, Blackjack Oak and Winged Elm. The compound proved ineffective on clay soils and also against Green-Brier [*Smilax glauca*], Haws, Yaupon [*Ilex vomitoria*], Gums, Hickory [*Carya* spp.] and other hardwoods.

1967. DARROW, R. A. **Aerial spraying with 2-(2,4,5-TP) and 2,4,5-T for control of Post and Blackjack Oaks**. *Proc. 10th ann. Sth. Weed Conf.* 1947 (120–3). 3 refs. O.R.E.

Presents the results of comparative tests conducted over the years 1952–55. 2-(2,4,5-TP) seems to be generally superior to 2,4,5-T ester in both single and repeated applications for the control of Post and Blackjack Oaks. In general, a programme of two successive treatments totalling 2 lb./acre of 2-(2,4,5-TP) or 2·5 lb./acre of 2,4,5-T esters is recommended for stands dominated by these Oaks. For areas with substantial amounts of other hardwood

species and underbrush, initial applications of 2,4,5-T ester at 2 lb./acre are recommended and should be followed in the succeeding year by 1 or more lb./acre of 2,4,5-T. *From author's summary.*

1968. DARROW, R. A., and MCCULLY, W. G. **Comparison of granular forms of urea herbicides in aerial and hand broadcast applications for the control of Post and Blackjack Oak.** *Proc. 10th ann. Sth. Weed Conf.* 1957 (124–8). 1 ref. O.R.E.

Broadcast and aerial applications of granular or pelleted forms of the urea herbicides monuron and fenuron, gave effective control of Post and Blackjack Oaks growing in sandy or sandy-loam soils, at rates showing little or no inhibitory effects on associated perennial forage grasses. Preliminary comparisons indicate that fenuron has a more rapid and greater effect than monuron in defoliation and root-kill of Post and Blackjack Oaks and associated species. The most pronounced effects were noted on Oaks growing on deep sands. Applications of fenuron at 3–4 lb./acre seem to control Post and Blackjack Oaks if made before the spring rainy period. Higher rates of monuron appear to be necessary to give adequate control. No better control of Post and Blackjack Oak was obtained by the addition of borate to monuron in Ureabor and XPI-10 formulations. *From authors' summary.*

1969. DARROW, R. A. **Control of Post and Blackjack Oak and other brush by aerial spray applications of herbicides.** *Proceedings, 5th annual Texas agricultural Aviation Conference, College Station* 1956 (*F*1–*F*4). 2 refs. From *abstr.* in *Weed Abstr.* 7 (4), 1958 (556). O.R.E.

The esters of 2,4,5-T and 2,4,5-TP at 2·5 lb./acre in a 1/3 oil/water emulsion, applied aerially for the control of hardwoods, caused only minor temporary injury to Loblolly and Shortleaf Pine and no injury to Longleaf Pine. Aerial spraying with the ester, amine, and salts of MCPA at 1·25 lb./acre gave equivalent results in controlling *Aloysia ligustrina* and justified further trials.

1970. BEATTY, R. H. [Editor]. **Brush on right-of-ways. (2 reports).** *Res. Rep. 13th ann. Nth. Cent. Weed Control Conf.* 1956 (165). From *abstr.* in *Weed Abstr.* 7 (3), 1958 (419). O.R.E.

2,3,6-TBA at 2–4 lb./acre in 15–30 gal. water/acre, as a foliage spray, killed White Poplar, Ash, Willows and Wild Rose; Bur Oak was dying 1 year after treatment; Dogwood [*Cornus* spp.] seems to have survived and Hazel shows regrowth. An over-all dormant spray of 2–4 lb./acre in 15 gal. of diesel oil applied by an air-blast machine showed the different species to be affected in a similar way but to a lesser extent.

1971. ELWELL, H. M. [Editor]. **Control of brush on rangeland and pastures (10 reports).** *Res. Rep. 13th ann. Nth. Cent. Weed Control Conf.* 1956 (159–64). From *abstr.* in *Weed Abstr.* 7 (3), 1958 (418). O.R.E.

Mesquite [*Prosopis juliflora*]: In laboratory screening tests 2,4,5-TB proved to be as active as 2,4,5-T; MCPB and 2,4-DB were much less active. The nopyl and hydronopyl esters of 2,4,5-TP, MCPA, 2,4-D, 2,4-DP and 4-CPA were less active than the same esters of 2,4,5-T which seem more promising. As a foliage application, 2,3,6-TBA appears to be as active as equal amounts of 2,4,5-T. Aerial applications of pellets of monuron and fenuron have shown some promise. One report recommends a low-volatile ester of 2,4,5-T at 0·33 lb./acre in 0·5 gal. diesel oil + 2·5 gal. water/acre applied in 60-ft. swaths. Sand Shinnery Oak [*Quercus havardii*]: foliage applications of 2,3,6-TBA were less effective than comparable amounts of 2,4,5-T; monuron and fenuron at 5 lb./ acre as a liquid aerial application were inactive, whereas 3 lb./acre as pellets or band treatments were good. Salt Cedar [*Tamarix gallica*]: monuron and fenuron at 10 lb./ acre gave only 40% kill. *Cornus drummondi* and *C. stolonifera*: aerial application in 5 gal. diesel oil/acre of 2,4-D at 2 and 2,4,5-T at 2 lb./acre (esters) and 2,4,5-TP at 2 lb./acre (ester) were promising; lower rates, 2,4-D alone or 2,4,5-T at 1–2 lb./acre plus TBA at 2–3 lb./acre were unsatisfactory. A table gives the effect of 2 annual treatments with 2,4,5-TP at 1–2 lb./acre, 2,4-D at 1–2 lb./acre + 2,4,5-T at 1–2 lb./acre and 2,4,5-T at 2 lb./acre on several species. Bur, Red and White Oaks [*Quercus macrocarpa, Q. borealis* and *Q. alba*] were controlled 90% by 2,4,5-TP at 1 lb./acre; Elm [*Ulmus* sp.] not more than 50% by any treatment; Ash [*Fraxinus* sp.] 96% by 2,4-D at 2 lb./acre + 2,4,5-T at 2 lb./acre; Hackberry [*Celtis* sp.] 98–100% by 2,4-D at 1–2 lb./acre + 2,4,5-T at 1–2 lb./acre; Dogwood [*Cornus* spp.] 90–100% by 2,4,5-TP at 2 lb./acre, 2,4-D at 1–2 lb./acre + 2,4,5-T at 1–2 lb./acre; Honey Locust [*Gleditsia* sp.] 85–95% by 2,4-D at 1–2 lb./acre + 2,4,5-T at 1–2 lb./acre. Hawthorn [*Crataegus* sp.] and Osage Orange [*Maclura* sp.] were controlled wherever 2,4,5-T at 1 lb./acre was used.

1972. DARROW, R. A. **Trichlorobenzoic acid and associated herbicides in the control of woody plants in Texas.** *Proc. 10th ann. Sth. Weed Conf.* 1957 (132–8). 3 refs. O.R.E.

Reports on the response of several woody species to foliage sprays, basal sprays and soil-injection treatments with chlorobenzoic acid [TBA] formulations. 2,3,6-TBA formulations were more effective than polychlorobenzoic ones in foliage-spray and soil-injection treatments. TBA formulations were found to be comparable in effectiveness to 2,4,5-T ester as soil injections against Eastern Persimmon and Live Oak, as foliage sprays on Prickly Pear, and as basal sprays on Post Oak and Winged Elm. TBA formulations have been generally less effective than 2,4,5-T or 2-(2,4,5-TP) esters as foliage sprays against Post Oak, Blackjack Oak and associated species. However 2,3,6-TBA applied aerially in oil sprays at 2 to 4 lb./acre has resulted in top kill and defoliation comparable to that obtained with 2,4,5-T and 2-(2,4,5-TP) esters at 1·5 lb./acre. *From author's summary.*

1973. CARTER, M. G. **Reclaiming Texas brushland range.** *Journal of Range Management, Portland* 11 (1), 1958 (1–5). 7 refs. From *abstr.* in *Weed Abstr.* 7 (4), 1958 (559). O.R.E.

The history of this region, which was originally almost pure grassland, is outlined. The most

prevalent woody species are *Prosopis juliflora*, *Acacia* spp., *Celtis pallida*, *Aloysia ligustrina*, *Cordalia* spp., *Porlieria angustifolia*, *Leucophyllum frutescens* and *Cercidium* spp. for the control of which chaining, chopping, spraying with kerosene and herbicides, and dozing have not been altogether satisfactory. Root ploughing has given excellent results; fitting fins to the blade (at an angle of 25° and long enough to reach the surface) has greatly improved the kills obtained and broken the soil crust. Re-seeding with grass is essential to prevent re-infestation, and the exhaust of the tractor operating the plough is used to scatter the seed.

1974. BLYDENSTEIN, J. **The survival of Velvet Mesquite (*Prosopis juliflora* var. *velutina*) after fire.** *Journal of Range Management*, *Portland* 10 (5), 1957 (221–3). 19 refs. From *abstr.* in *Weed Abstr.* 6 (12), 1957 (2006). O.R.E.

Summer and winter burns caused a mortality of only 5 and 1% respectively, restricted to trees of < 1 in. diameter. The smaller trees suffered the heaviest damage. Coppicing after top kill occurred in about half the trees. Recurrent fires might cause higher mortality but would be uneconomic for eradication of established stands.

1975. TSCHIRLEY, F. H. [Editor]. **Undesirable woody plants (12 reports).** *Res. Progr. Rep.* [*17th*] *ann. West. Weed Control Conf.* 1957 (41–50). From *abstr.* in *Weed Abstr.* 6 (12), 1957 (1994). O.R.E.

With *Quercus wislizenii* the full effects of monuron and 2,4,5-T (amine) were not apparent for 3–5 years after treatment. With *Q. turbinella* 2,4,5-TP (ester) gave better results than 2,4,5-T (ester and amine), 2,4-dichlorophenoxypropionic acid, 2,4-D (ester and amine), aminotriazole, dalapon + 2,4-D + 2,4,5-T. With *Artemisia tridentata* the addition of urea, H_3BO_3 or a copper chelate to 2,4-D or 2,4,5-T (ester) solutions had no significant effect. *Arctostaphylos parryana* var. *pinetorum* is equally susceptible to 2,4-D and 2,4,5-T in May–July but by late September it succumbs more to 2,4-D, and *Ceanothus velutinus* more to 2,4,5-T. Use of a summer oil at 1 gal./acre, emulsified with the water carrier, reduced the amount of 2,4-D or 2,4,5-T required from 0·75 to 0·5 lb./acre. Ponderosa Pine can tolerate about twice as much 2,4,5-T as 2,4-D and about twice as much of either in water as in the emulsion. *A. columbiana*, *A. canescens*, *A. patula* and *C. integerrimus* were more susceptible to 2,4-D than to 2,4,5-T, *C. velutinus* and *C. cordulatus* vice versa. Amino-triazole shows promise on *Ceanothus* spp., *Quercus chrysolepis* and *Lithocarpus densiflora*; 2, 4-D and 2,4,5-T were equally effective. With *Amelanchier florida* and *C. integerrimus* 2,3,6-TBA was less effective than 2,4-D or 2,4,5-T. *Opuntia engelmanni* and *O. spinosior* were little affected by burning, while *O. fulgida* actually spread.

1976. LEONARD, C. A., and CARLSON, C. E. **Control of chamise and brush seedlings by aircraft spraying.** *Range Improvement Studies*, *California Division of Forestry*, *Sacramento* No. 2, 1957. pp. 27. 16 refs. From *abstr.* in *Weed Abstr.* 7 (2), 1958 (240). O.R.E.

Reports several years' work on the chemical control of *Adenostoma fasciculatum*. Established plants and regrowth over 1 year old are very difficult to kill and the best results have been obtained by spraying in spring after an autumn or summer burn. Mixed esters of 2,4-D and 2,4,5-T at 2–4 lb./acre have given better results than 2,4-D alone, and low-volatile esters in diesel-oil emulsion are best. Adequate soil moisture at the time of spraying and reseeding with grasses enhances the results. *Quercus dumosa*, *Eriodictyon californicum*, *Haplopappus arborescens*, *Helianthemum scoparium*, *Ceanothus cuneatus* respond similarly to *Adenostoma*, while *Salvia sonomensis* and *Lotus scoparius* are sensitive at all stages of growth. Surviving brush sprouts in the areas treated in the spring, e.g. *Photinia arbutifolia*, *Rhamnus californica*, *Quercus wislizenii* and *Q. durata* should be spot-sprayed that same autumn.

1977. **Wild Rose can be controlled.** *Oregon Agricultural Progress*, [*Corvallis?*] 5 (2), 1958 (12–3). From *abstr.* in *Weed Abstr.* 7 (8), 1958 (1314). O.R.E.

Spraying in the second half of May or during June in the Corvallis area, with 2 lb. 2,4-D + 2 lb. 2,4,5-T/ 100 gal. water, eradicated Wild Rose [*Rosa* spp.]. Old plants seem to be more susceptible than young. Rotational grazing is recommended after spraying.

1978. BULGER, R. O. **Barberry eradication in the United States.** *Report*, *3rd International Wheat Rust Conference* 1956 (116–8). From *abstr.* in *Weed Abstr.* 7 (9), 1958 (1522). O.R.E.

Berberis fendleri is killed with a low-volatile 2,4-D ester solution used as a foliage spray. Oil is used for dormant spraying in autumn and winter. Brush Killer 32-P (2 parts 2,4-D and 1 part 2,4,5-T + PCP) in oil is effective on *B. canadensis*. Oil solutions of MCPA and Brush Killer 32-P have given equally good results in killing *B. vulgaris*, and for scattered plants NH_4 sulphamate applied to cut-off canes at ground level is effective.

1979. **Seasonal notes. Weed control.** *Tasmanian Journal of Agriculture*, *Hobart* 29 (1), 1958 (42). From *abstr.* in *Weed Abstr.* 7 (9), 1958 (1523). O.R.E.

The following recommendations are made: for *Rubus* spp., 2,4,5-T (0·1% solution or as manufacturer's specification) in January and February; *Genista canariensis*, 2,4,5-T at 1 oz./2 gal. as a spot spray, or 0·1% (Jan. and Feb. with respray); *Rosa rubiginosa*, 2,4,5-T at 1·5 oz./3 gal. = 1 pint diesel distillate/4 gal. as a spot spray (Jan. and Feb. with resprays); *Ulex europaeus*, 2,4,5-T at 2 oz./3 gal. as a spot spray (Dec.–Feb. with resprays, or fallowing where ploughing is possible); TCA at 100 lb./acre in autumn or winter; *Acacia dealbata* and *A. mollissima*, 2,4,5-T (0·1–0·2%) in summer, or thorough cultivation and fallowing before sowing.

1980. **Weed control. Recent developments.** *Tasmanian Journal of Agriculture*, *Hobart* 29 (2), 1958 (165–7). From *abstr.* in *Weed Abstr.* 7 (9), 1958 (1524). O.R.E.

The ecology and reproductive habits of gorse [*Ulex europaeus*] are discussed. One method of

control is to use a bulldozer and then a chisel-type ripper, and immediately after, oversow a grass/clover mixture and apply an appropriate fertilizer. Where ploughing is possible, gorse can generally be controlled by cutting or burning followed by deep ploughing and maintenance of a pasture sward. Where no cultivation is possible, burning in March-April with or without prior application of diesel oil or 2,4,5-T, followed by oversowing, is recommended. Gorse can also be suppressed by planting *Pinus radiata* or any quick-growing forest trees. It is susceptible to 2,4,5-T, but bushes over 4 ft. high require too much for this form of control to be economic. Seedling gorse is effectively controlled by a 0·1–0·2% solution applied from Oct. to March, and established coppice or regrowth by 0·2% applied in Jan.–Feb. Retreatment 2 months later is advisable. Warm dry weather is best for spraying.

1981. LITTLE, E. C. S. **The helicopter as an agricultural tool [in New Zealand].** *Repr.* from *Journal of the Royal Aeronautical Society, London* 62 (570), 1958 (437–45).

Includes notes on the use of helicopters for cutting tracks 2–3 ft. wide through thick scrub by concentrated chemicals applied through specially designed jets, and possible extension of this technique to thinning. Also discusses uses for control of insect pests, weed species, and Willows encroaching on river beds.

1982. IVENS, G. W. **Colonial pesticides research, Arusha. Report on arboricide experiments, February-December, 1955. Parts I & II.** *Pesticides Abstracts and News Summary, London* 3C (1; 2), 1957 (10–29; 93–109). O.R.E.

[Cf. *F.A.* 17 Nos. 550, 4082.] (I) Reports details of further observations on past experiments and preliminary observations on new trials in the chemical control by various methods of the following species: *Commiphora schimperi, Dichrostachys glomerata, Combretum* spp., and *Acacia* spp. (II) (*a*) Continues the report of the control of individual woody species, viz. *Grewia microcarpa, Balanites* sp., *Lannea* spp., *Tarchonanthus camphoratus* and *Euclea divinorum*; (*b*) reports experiments on the following mixed tree communities: *Brachystegia/Pseudoberlinia* woodland (Miombo) and *Combretum/Commiphora* thicket; (*c*) deals with experiments on some perennial weeds.

1983. IVENS, G. W. **The effects of arboricides on East African trees and shrubs—I. *Acacia* species.** *Trop. Agriculture, Trin.* 35 (4), 1958 (257–71). 21 refs.

General conclusions from the series of experiments described are that, for basal sprays in diesel oil, 2,4,5-T (*n*-butyl) appears to be more effective than ester formulations of 2,4-D. Concentrations of the former of 0·5% were frequently effective and increases above 1–2% gave little advantage. Frill girdling intensified the effect in the larger *A. nigrescens, A. senegal,* and *A. tortilis*, especially the first, which is also killed by band girdling. For such non-regenerating species any season appears suitable for spraying, and the frilling of smaller species does not appear necessary. The small trees *A. hebecladoides, A. zanzibarica, A. mellifera, A. seyal* var. *fistula, A. subalata,* and stumps of the large *A. lahai* were mostly killed with 0·5–1% concentrations without frilling. Regrowth of the first was killed with CMU. The shrubs *A. nubica* and *A. hockii* and regrowth of the climber *A. pennata* were completely or partly killed at the same strengths but *A. pennata* may need repeated applications. The growing season appears the best for spraying species that regenerate vegetatively.

1984. **Tree eradication, coppice and scrub control.** *Report, Grasslands Agricultural Research Station, Marandellas, S. Rhodesia* 1956 (26). From *abstr.* in *Weed Abstr.* 7 (1), 1958 (105). O.R.E.

The effect of burning veld at various intervals shortly before the first rains is being studied in relation to the control of *Brachystegia spiciformis/Isoberlinia globiflora* coppice. Monuron at 20–60 lb./acre as a ground spray and NH_4 sulphamate applied to cuts in boles of trees were both ineffective.

1985. WEST, O. **Brief summary of trials with herbicides on trees and scrub at the Grasslands Research Station, Marandellas [S. Rhodesia].** *Pesticides Abstracts and News Summary, London* 4c (1), 1958 (3–6). From *abstr.* in *Weed Abstr.* 7 (4), 1958 (551). O.R.E.

In trials for the control of *Brachystegia spiciformis* and *Isoberlinia globiflora* the following were ineffective: 2,4-D (ester) and/or 2,4,5-T (ester), in diesel oil, and diesel oil alone, all applied at 4 different seasons at 5 lb./100 gal. (acid equivalent per 100 imperial gal. water), at 11 ml. per inch circumference for basal bark and stumps, at 10 lb./100 gal. for frills, and 2 lb./100 gal. for foliage sprays; monuron at 20, 40 and 60 lb./acre sprayed in 1 ft. strips at intervals of 20, 40 and 80 ft. (negative results 1 year after treatment); and NH_4 sulphamate crystals applied to notches of standing trees. Arsenious oxide which was applied at 39% weight for weight (except on basal bark) proved effective [but % of kill not given]. In a trial in 1946, Na arsenite (crystals) at 5 lb./gal. water gave 99% kill of thorn, mainly *Acacia subalata*, when applied to slashed stumps. Illuminating and power paraffin, applied by brush to the junction of the root and stem after digging away soil, were unsatisfactory. Preliminary results of treatments with 2,4,5-T at 5–20 lb./100 gal. show a high mortality of Mopane [*Copaifera mopane*] and *Grewia* sp. with treated stumps, but bark and stab treatments were ineffective. *Combretum apiculatum* and *Commiphora mollis* were resistant to all treatments. Foliar spraying of *Acacia heteracantha* was unsuccessful at 10 lb./100 gal. in water.

1986. MUNE, T. L., and PARHAM, J. W. **Weed control: Guava and its control in Fiji.** *Agricultural Journal, Fiji* 27 (3/4), 1956 (103–8). O.R.E.

Gives a botanical description of the tree, which is considered a weed in Fiji. Uprooting followed by repeated ploughing gives good control, while systematic burning can also be done in some areas. Spraying or basal painting with ester formulations of 2,4,5-T is the best method of chemical control.

442. Parasitic (Higher) Plants. Epiphytes. Climbers

See also No. 1989.

1987. OFFORD, H. R. **Dwarf mistletoe in conifers.** *Proc. 10th ann. Calif. Weed Conf.* 1958 (18–22). O.R.E.

Presents some general notes on *Arceuthobium americanum*, *A. douglasii* and *A. campylopodum*. In experiments on chemical control, the following treatments suppressed the aerial parts of the parasite without damaging the host: foliage sprays of aqueous 2,4-D, 2,4,5-T, maleic hydrazide, CIPC, PCP and Sodar [disodium methyl arsenate] and tree injections of PCP (Na), H_3BO_3, and a mixture of maleic hydrazide and the amine salt of 2,4-D.

443. Fungi and Bacteria

See also Nos. 1495, 1522, 1610, 1631, 1911–2.

1988. VELDEMAN, R., and WELVAERT, W. Onderzoek van de luchtschimmelflora. **[Research on the fungus flora in the air.]** *Mededelingen van de Landbouwhogeschool en de Opzoekingsstations van de Staat te Gent* 22 (3), 1957 (561–72). [Du.du.f.e.g.] O.R.E.

Results of spore counts obtained from an automatic spore trap are given in tables showing weather conditions for various dates in March–April when the counts were made, and the number of spores trapped of different species. The spore trap was set up at St. Martens-Latem near a plantation of Lombardy and hybrid Black Poplars, and a row of Poplar branches heavily infected with *Dothichiza* and carrying ripe fruit bodies was put 10 m. from the trap; the spread of the spores throughout the season will be determined and reported later.

1989. SHEARER, R. C., and MIELKE, J. L. **An annotated list of the diseases of Western Larch [*Larix occidentalis*].** *Res. Note Intermt. For. Range Exp. Sta.* No. 53, 1958. pp. 5. 27 refs.

4 seedling and 5 leaf fungi, 8 cankers, 4 root rots and 10 other decay fungi, and the mistletoe *Arceuthobium campylopodum* are listed, each with reference to the literature.

1990. SARASOLA, A. A., and SARASOLA, M. A. R. DE. Reseña de las enfermedades del eucalipto en la Argentina. **[Review of diseases of Eucalypts in Argentina.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 247–200, 1957. pp. 8. [Span.]

Lists: (1) diseases (by name) caused by cryptogams and fungi of minor importance, with notes; (2) scientific names of fungi causing minor diseases, with their hosts; (3) host species according to their susceptibility or non-susceptibility to injury by inorganic agencies, e.g. frost, drought etc., and to injuries of unidentified origin; (4) virus diseases.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

1991. VOLGER, C. Untersuchungen zum Problem der chemischen Bekämpfung pilzparasitärer Keimlingskrankheiten unserer Nadelbäume. **[Investigations on the chemical control of parasitic fungal diseases of native conifer seedlings.]** *Forstwiss. Cbl.* 76 (9/10), 1957 (294–305). 5 refs. [G.g.]

A more detailed version of work noticed in *F.A.* 19 No. 4396.

1992. VOLGER, C. Probleme der Bekämpfung von pilzparasitären Keimlingskrankheiten bei Nadelbäumen. **[The control of parasitic fungi attacking conifer seedlings.]** *Mededelingen van de Landbouwhogeschool en de Opzoekingsstations van de Staat te Gent* 22 (3), 1957 (517–25). [G.f.e.] O.R.E.

Laboratory and greenhouse experiments with agricultural seed dressings, sprays and dusts applied to tree seed or seedlings showed that many preparations harmless to agricultural crops were harmful to tree seedlings, e.g. Pines, Spruce and Larch were damaged by mercury seed dressings. The seed dressings were unsuitable also because of the relatively short duration (3–5 weeks) of their effectiveness. A series of experiments was made with Pine grown on a substrate infected by *Rhizoctonia*, *Fusarium*, *Botrytis* and *Pythium* spp., testing 15 commercial chemicals for their effect on germination and their control of disease; the chemicals are listed in order, showing their effects in relation to controls. Best results were obtained from Tripomol, a seed dressing containing TMTD [thiram], for which a systemic effect is suggested. The need for an adequate water supply to the seedlings is stressed; much heavier infection occurred in a neighbouring seedbed exposed to sunshine and kept fairly dry, than in the experimental one which was shaded and kept moist.

1993. ZAMUCO, B. E. **Control of *Rhizoctonia* damping-off of Benguet Pine (*Pinus insularis* Endl.) seedlings by chemical treatment of soils and seeds.** *Philipp. J. For.* 11 (1/2), 1955 (1956), (1–7). 12 refs.

Formaldehyde (40%) diluted with 6 times its volume of water and applied to the soil, reduced infection to a minimum. ZnO was more effective than Cu_2O as a soil dressing, but both were ineffective when used to treat seeds before sowing.

1994. RODRIGO, B. B. **Pythium stem rot of Brazilian Fire Tree (*Schizolobium excelsum* Vogel) seedlings.** *Philipp. J. For.* 11 (1/2), 1955 (1956), (87–99 + 2 photos, 1 dgm.). 12 refs.

An outbreak in a forest nursery was investigated and the pathogen tentatively identified as *Pythium debaryanum*, which also attacks seedlings of other economic species. Control measures are suggested.

1995. **Keithia disease of *Thuja plicata*.** *Leafl. For. Comm., Lond.* No. 43, 1958. pp. 5. Price 1*s.* 3*d.*

Describes symptoms and damage caused by *Didymascella thujina* and also of a *Pestalotia* sp., and discusses control. So far spraying with Bordeaux mixture has not been successful in Great Britain.

1996. KYRYLENKO, T. S. Aktyvna kyslotnist' klitynnogo soku v tkanynah lystkiv duba, uraženogo borošnystoju rosoju. **[Active acidity of the cell sap in the tissues of Oak leaves attacked by *Microsphaera alphitoides*.]** *Botaničnyj Žurnal, Kyjiv* [*Kiev*] 12 (4), 1955 (93–7). 7 refs. [Ukr.russ.] A.P.B.

The acidity of the cell sap of leaves of seedlings, saplings and adult *Quercus robur* depends on the degree of damage to the leaves, and on the stage of fungus growth. With slight damage, acidity is higher than in the healthy leaves; with an increase in damage, acidity decreases and becomes the same as in healthy leaves; when cleistocarps are formed, the acidity decreases further.

1997. MAGNANI, G. Alteraciones en las hojas del eucalipto. **[Leaf necrosis of Eucalypts.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 269–200, 1957. pp. 3 + 1 plate. [Span.]

The cause of leaf necrosis of young *Eucalyptus* plants was found to be *Alternaria tenuissima.* Damage is rarely serious enough to require chemical control.

443.3. Diseases of Older Stages

Stem, Butt and Root Rots; Root Diseases

See also Nos. 2123, 2127.

1998. RENNERFELT, E. Den ekonomiska förlusten till följd av skogsröta i våra granskogar. **[The economic loss from rot in Swedish Spruce forests.]** *Skogen* 45 (22), 1958 (677–8). [Sw.]

Presents estimated figures, based on an investigation in 5 stands and a stump inventory covering the whole country, showing annual reduction in value as a result of rot for different regions and the whole country.

1999. STILLWELL, M. A. **Deterioration of fire-killed Balsam Fir and Spruce stands in Newfoundland and New Brunswick.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (4), 1958 (1).

Recent studies and observations confirm the minor importance of sapwood rots in standing fire-killed Spruce and Balsam Fir. In one 12-year-old burn in New Brunswick, 25 trees averaging 4·8 in. d.b.h. were found to contain an average of only 0·2 in. of firm rot in the outer sapwood. Successful salvage operations are reported in an 18-year-old burn, predominantly Spruce, in Newfoundland.

2000. NORDIN, V. J. **Basal fire scars and the occurrence of decay in Lodgepole Pine.** *For. Chron.* 34 (3), 1958 (257–65 + 7 photos). 12 refs.

An examination of Lodgepole Pines with basal fire scars has shown a correlation between the incidence of fungi entering the scars and the area of the scars. A number of fungi entering the scars and associated with red stain, other decays, and blue stain, are identified and illustrated. The significance of fire scars in the management of Lodgepole Pine in Alberta is discussed.

2001. WALDSCHMIDT, H. Beobachtungen über das Auftreten von Hallimasch in Nadelholzbeständen. **[Observations on the occurrence of *Armillaria mellea* in conifer stands.]** *Allg. Forstzeitschr.* 13 (44), 1958 (644). [G.]

The author claims to have noticed that the uneven incidence of infection is connected with the presence or absence of subterranean watercourses, instancing a case of Spruce and Douglas Fir in a coppice-conversion area at Endbach (Hesse).

2002. RAABE, R. D. **The effect of light upon growth of *Armillaria mellea* in culture.** *Abstr.* in *Phytopathology* 48 (8), 1958 (397).

Growth was more abundant in the dark than in the light. The fungus developed poorly under blue and red filters, better under a green filter, and very well under a yellow filter.

2003. KLJUŠNYK, P. I. Koreneva gubka *Fomes annosus* (Fr.) Cke. **[*F. annosus.*]** *Botaničnij Žurnal, Kyjiv* [*Kiev*] 12 (3), 1955 (97–105). 6 refs. [Ukr.russ.] A.P.B.

Covers diagnosis of attack, description of the fungus, comparison of growth of healthy and damaged Scots Pine, predisposing factors, and possible control measures.

2004. BAKSHI, B. K. **News from India.** *Commonw. phytopath. News* 4 (4), 1958 (62–3).

A survey of coniferous forests in the Himalayas between 8000 and 10,000 ft. in the Lower Bashahr Division, Himachal Pradesh, in June 1958 revealed: (1) A heavy attack of *Fomes pini* on *Pinus excelsa* (particularly heavy in forests near villages that have lopping concessions), (2) *Coleosporium barclayense* on *P. excelsa*, (3) *Chrysomyxa deformans* on *Picea morinda*, (4) *C. piceae* developing telia on *P. morinda* needles, and (5) ectotrophic mycorrhizae on *Pinus excelsa* and endotrophic mycorrhizae on *Taxus baccata.*

2005. KIMMEY, J. W. **The heart rots of Redwood [*Sequoia sempervirens*].** *For. Pest Leafl. U.S. For. Serv.* No. 25, 1958. pp. 7. 4 refs.

Mainly a white ring rot caused by *Poria albipellucida* and a brown cubical rot caused by *P. sequoiae.*

2006. ESLYN, W. E. **Decay of Silver Maple (*Acer saccharinum* L.) in Central Iowa.** *Abstr. of thesis*, in *Iowa St. Coll. J. Sci.* 32 (2), 1957 (171–2). O.R.E.

From increment cores taken from 845 trees only two fungi, *Pholiota adiposa* and *Polyporus lucidus*, were identified with certainty. Incidence of infection in various areas, extent and causes of butt rot, and results of thulium X-ray photography are discussed.

2007. BASHAM, J. T. **Decay of Trembling Aspen.** *Repr.* from *Canad. J. Bot.* 36, 1958 (491–505 + 2 plates). 11 refs.

A total of 1754 *Populus tremuloides* were examined on 47 sample plots in even-aged stands in N. Ontario. Decay was found in the merchantable portions of 1212 boles (69%). Three types of heart rot were encountered, associated with *Fomes igniarius* var. *populinus*, *Radulum casearium*, *Pholiota spectabilis*, *Armillaria mellea* etc. *Corticium polygonium*, and two Fungi Imperfecti, *Libertella* sp. and *Phialophora alba*, were consistently isolated from heartwood stains and incipient decays. A pronounced relationship existed between age and decay; older stands usually contained a higher % of decayed heartwood than young stands. A less pronounced relationship was found to exist between soil conditions and decay; trees occurring on drier sites were somewhat more decayed than those

growing on moist sites. Possible reasons are discussed why the decay process in the heartwood of living Aspen is one in which certain fungi, mainly Fungi Imperfecti, colonize and stain the wood prior to its invasion and destruction by the Basidiomycetes associated with advanced decay. *From author's summary.*

2008. GOOD, H. M., and SPANIS, W. **Some factors affecting the germination of spores of *Fomes igniarius* var. *populinus* (Neuman) Campbell, and the significance of these factors in infection.** *Canad. J. Bot.* 36 (3), 1958 (421–37). 5 refs. O.R.S.

Spores of *F. igniarius* collected from different conks, or at different times of year, varied significantly in germinative capacity. Spores germinated well at temperatures of 20–35° C. They also varied widely in ability to germinate after storage. Findings are discussed.

2009. ETHERIDGE, D. E., and LAUT, J. **Fungi associated with living and dead branches of pole-sized Aspen.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (4), 1958 (2–3).

Three classes of dead branches, (*a*) intact, (*b*) protruding stubs, and (*c*) buried stubs, were sampled on 2 dead and 9 living *Populus tremuloides* growing on a medium-quality site. Several species of fungi and bacteria were isolated from the heartwood and dead branches, and from the adjacent pith region of the stems, but rarely were any obtained from either the region of tension wood above the axes of the branches or from the embedded portion of living branches. Of 52 living branches sampled, only one yielded a fungus. The larger number of infections occurring in the heartwood of broken than of intact dead branches, suggests that the physical condition of the wood, e.g. its moisture content, may be decisive in determining when infection takes place.

2010. MOCANU, V. V. Experimentări de infecţii artificiale cu ciuperci xilophage la specie de *Populus*, *Quercus* şi *Picea*. **[Experiments in the artificial inoculation of species of *Populus*, *Quercus* and *Picea* with wood-rotting fungi.]** *Rev. Pădurilor* 1958 (5), (287–91). 7 refs. [Rum.russ.g.f.e.]

The experiments reported included inoculation of (*a*) 2 trees of *Populus nigra* var. *italica* with laboratory cultures of *Fomes marginatus* and *Trametes gallica* f. *trogii* respectively; (*b*) one tree of hybrid Black Poplar [not further specified] with laboratory cultures of *F. marginatus*, and 13 with *T. gallica* f. *trogii*; (*c*) 11 trees of *Quercus robur* with *F. cytisinus* and *T. lactea* (isolated from Oaks); (*d*) 12 trees of *Picea abies* with *F. marginatus* (isolated from Spruce). Observations were made on the development of the fungi, progress of attack etc., and methods of inoculation are discussed in some detail. The use of strains of fungi isolated from the same tree species as the subject of experiment, is recommended.

2011. RIGGENBACH, A. ***Fomes noxius*, a thiamine-deficient fungus.** *Nature, Lond.* 182 (4646), 1958 (1390–1). 5 refs.

The tropical brown root-rot caused by *F. noxius* is of widespread occurrence and is found on the roots of a great number of tropical plants such as species of *Artocarpus*, *Cinchona*, *Coffea*, *Grevillea*, *Erythrina*, *Eriodendron*, *Elaeis*, *Hevea*, *Thea*, *Theobroma*, and forest trees. It has apparently not previously been grown in pure culture. Attempts to grow it in partly artificial media were unsuccessful, but as soon as organic material was added luxuriant growth was observed. It appears that *F. noxius* is unable to synthesize either the whole thiamine molecule or its two constituent parts, pyrimidine and thiazole, but is able to combine pyrimidine and thiazole into thiamine. It also appears to be unable to make use of N in the form of nitrate.

Wilts, Diebacks etc.

2012. FOWLER, M. E. **Oak wilt [*Ceratocystis fagacearum* (*Chalara quercina*)].** *For. Pest Leafl. U.S. For. Serv.* No. 29, 1958. pp. 7. 4 refs.

Distribution, hosts, symptoms, spread, damage, and control in the U.S.A.

2013. JONES, T. W., and BRETZ, T. W. **Experimental Oak wilt control in Missouri.** *Res. Bull. Mo. agric. Exp. Sta.* No. 657, 1958. pp. 12. 15 refs.

Several treatments, suggested as control measures for the Oak wilt disease, were tested experimentally in Missouri for a period of 5 years. Isolation of diseased trees by poisoning surrounding healthy Oaks, sanitation by cutting and burning diseased trees, and a combination of both treatments were applied on a number of 40-acre plots. None of these measures, as applied in Missouri, resulted in control of the disease. The number of trees infected with wilt each year on untreated plots remained relatively constant during the study. The number of trees infected each year on the treated plots fluctuated erratically but no consistent improvement in the disease situation occurred. *From authors' summary.*

Cankers, Stem Rusts etc.

See also Nos. 1463, 1988, 2024.

2014. HOPP, P. J. Zur Kenntnis des Lärchenkrebses. **[*Dasyscypha willkommii*] on *Larix decidua*.]** *Forstwiss. Cbl.* 76 (11/12), 1957 (334–54). 44 refs. [G.g.]

From investigations on 5 severely damaged trees, and some young cankered Larch plantations, it was found, *inter alia*, that: (1) Almost all cankers started when the age of the shoots attacked was 2–5 years. Tree age had no significance. (2) Most stem cankers occurred on the green leading shoot, and only a few from branch cankers extending to the stem. (3) Dominant trees had more canker lesions: the larger their crowns, the more branch cankers could be formed. (4) Damage was commoner in dense closed stands than in opened ones; thinning cannot prevent canker attack, but probably does improve the resistance of the trees retained. (5) In fairly even-aged Larch/Spruce mixtures, a higher % of Spruce seems to promote damage on Larch. (6) There was no connexion between the occurrence of *Ernarmonia zebeana* and Larch canker.

2015. ENDE, G. VAN DEN. Het onderzoek over de populierenkanker veroorzaakt door *Pseudomonas syringae* v. Hall f. sp. *populea* Sabet. **[Studies on**

canker of Poplars caused by *P. syringae* f. sp. *populea*.] *Mededelingen van de Landbouwhogeschool en de Opzoekingsstations van de Staat te Gent* 22 (3), 1957 (527–34). 10 refs. [Du.du.e.] O.R.E.

Surveys research by the author and others since 1937 [cf. *F.A.* 17 No. 4112; 18 No. 3725].

2016. BUTIN, H. Untersuchungen über ein Toxin in Kulturfiltraten von *Dothichiza populea* Sacc. et Br. [**Studies on a toxin in culture filtrates of *D. populea*.**] *Phytopath. Z.* 33 (3), 1958 (135–46). 16 refs. [G.g.e.] O.R.S.

[Cf. *F.A.* 19 No. 622.] The conditions of culture and the extraction and test methods are described. In tests of inhibition of growth of *Bacillus subtilis* and of spore germination of *Ustilago zeae*, the effect of the toxin decreased with increasing pH. In wilting tests with *Solanum lycopersicum* the stem was damaged at pH values below 6, and the leaves at higher values. At pH 3·5, growth of various micro-organisms was inhibited. An aqueous solution of the toxin applied to wounds on *Populus* × *robusta* twigs cut in lengths and with the ends sealed with wax, produced damage similar to that caused in a natural attack by *D. populea*. Application of the toxin by this method to 5 *Populus* spp. and hybrids, *Castanea sativa*, *Fraxinus excelsior*, *Pinus sylvestris*, and 2 *Salix* spp. showed that all species were moderately to severely damaged by the toxin, irrespective of their resistance to attack by *D. populea*.

2017. WETTSTEIN, W., and DONAUBAUER, E. **Survey of *Dothichiza populea*. Austria.** [*Docum.*] *14th Sess. stand. exec. Comm. int. Poplar Comm., Rome 1958* No. *FAO/CIP/CP*/16-*A*, 1958. pp. 6. Limited distribution.

Discusses distribution, symptoms, time of occurrence and location of the disease, types of Poplar most susceptible, sites and water balance, prevention and control, including experiments. Spraying with Cu_2OCl_2 in May and mid-August reduced mortality of *Populus* × *robusta* saplings from 13% (controls) to 1%. A Dutch preparation, Kankerdood, and Agromycin 100 are also being tested.

2018. MEIDEN, H. A. VAN DER, and VLOTEN, H. VAN. Roest en schorsbrand als bedreiging van de teelt van populier. [**Rust and bark necrosis as threats to Poplar growing.**] *Ned. Bosb. Tijdschr.* 30 (9; 10), 1958 (261–73; 289). 6 refs. [Du.e.g.]

Since 1948–50, *Populus* × *marilandica* in N. Brabant has suffered considerable reduction in diameter growth, and it has been found impossible to grow *P.* × *serotina* and *P.* 'Heidemij cv.' (formerly known as '*P. deltoides* var. *missouriensis*'). The decrease in growth follows the extensive planting of Japanese Larch, the alternate host of *Melampsora larici-populina*, in the area, and consequent heavy attacks by the rust. *P.* × *gelrica* and a few other scattered clones less susceptible to the rust do not show the same reduction in growth. In 1957 a serious attack by *Cryptodiaporthe* (*Dothichiza*) *populea* occurred in plantations of *P.* × *marilandica* of different ages, 4000–5000 trees being killed and ca. 100,000 showing various stages of attack; similar attacks had occurred already on *P.* × *serotina* and on *P.* 'Heidemij', both more rust-susceptible. Rust favours subsequent attack by *D. populea* by causing early leaf-fall at a time when the latter is most active, and by delaying shoot ripening. Practical conclusions are that planting Larch near Poplars should be avoided, that Poplars susceptible to rust should be replaced by resistant ones, and that one-year cuttings, which are rarely infected by *D. populea*, should be used in establishing plantations. Nurseries should be regularly sprayed against rust, and close planting and heavy use of N fertilizers, both of which may cause rapid and prolonged growth, should be avoided.

2019. GREMMEN, J. Bijdrage tot de biologie van *Cryptodiaporthe populea* (Sacc.) Butin (*Dothichiza populea* Sacc. et Bri.). [**The biology of *D. populea*.**] *Ned. Bosb. Tijdschr.* 30 (9), 1958 (251–60). 12 refs. [Du.e.g.]

Research has confirmed that *C. populea* is the perfect stage of the fungus. Pure cultures from single ascospores of *C. populea* showed striking identity of appearance with those from *Dothichiza* pycnospores and formed pycnidia of *D. populea* in 4 weeks. The perithecia develop much later than the pycnidia; they are unlikely to cause infection in nurseries but this cannot be avoided in plantations. The danger of infection from pycnidia reaches a peak in May–June and in some years again in September–October. Inoculation experiments in which spores were applied to scars of bud scales on 1-year-old cuttings of *Populus* × *robusta* showed that the fungus can enter by this means and remain inactive until the tree is weakened, e.g. by transplanting; leaf scars in autumn or from leaves falling prematurely as a result of rust attack are other points of entry. In these experiments bark necrosis developed as late as 2 years after inoculation. Control by chemical methods, removal of infected material in nurseries, and use of resistant clones are briefly discussed.

2020. KOCHMAN, J. Zgorzel kory topoli powodowana przez grzyb *Valsa sordida* Nitschke i warunki jej występowania w Polsce. [**Bark necrosis of Poplars caused by the fungus *V. sordida*, and its occurrence in Poland.**] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (67–103). 30 refs. [Pol.russ.g.]

Reviews literature and reports investigations on the life history of the fungus and inoculation experiments on *Populus simonii* and *P. nigra*. The main hosts in Poland, apart from these two species, are *P. alba* var. *pyramidalis* and *P.* × *berolinensis*. Observations were also made on *Leucostoma nivea*, *V. ambiens* and *Euvalsa flavovirescens*.

2021. VERRALL, A. F. **Fusiform rust of Southern Pines.** *For. Pest Leafl. U.S. For. Serv.* No. 26, 1958. pp. 4. 6 refs.

2022. JEWELL, F. F. ***Cronartium fusiform*[*e*] extent below Slash Pine branch cankers.** *Abstr.* in *Phytopathology* 48 (8), 1958 (394).

Microscopic examination of stained sections from cankers 2–3 in. in diam. and 3–7 in. long revealed *C. fusiforme* mycelia in all swollen tissues but none > ½ in. beyond the margin of the canker, suggesting

that in suitable cases stem infection could be prevented by pruning infected branches.

2023. KING, D. B. **Incidence of White Pine blister rust infection in the Lake States.** *Sta. Pap. Lake St. For. Exp. Sta.* No. 64, 1958. pp. 12.

Results of a survey sampling 500 randomly selected White Pine plots, showing incidence of infection, infection rates in 1948–52 and by tree size-classes, relationship of *Ribes* population to infection rate, and the possible reduction of loss by pruning. The probable loss to White Pine on a 100-year rotation is estimated according to the present age of the stand and location in a zone of high, medium or low hazard.

Foliage Diseases

See also Nos. 1462, 1473, 2004, 2018.

2024. FUCHS, M. Les parasites mycologiques du sapin de Douglas—*Pseudotsuga taxifolia* (Lam) Britt. [**Fungus parasites of Douglas Fir.**] *Ann. Gembl.* 64 (3), 1958 (245–62). 15 refs. [F.] A.P.B.

Notes on *Phomopsis pseudotsugae*. *Rhabdocline pseudotsugae*, and *Phaeocryptopus gäumannii* on Douglas Fir in Europe—origin, distribution, symptoms, type of injury, susceptibility of different strains, morphology and biology of the parasite, site and climatic influences, and control measures.

2025. JAHNEL, H., and JUNGHANS, B. Über eine wenig bekannte Kiefernkrankheit (*Sclerophoma pityophila*). [***S. pityophila*, a little-known disease of Scots Pine.**] *Forstwiss. Cbl.* 76 (5/6), 1957 (129–32). 7 refs. [G.]

[Cf. *F.A.* 18 No. 3032.] Notes on laboratory cultures of *S. pityophila* and on the damage it does to Pine needles.

2026. BOYCE, J. S., JR. **Needle cast of Southern Pines.** *For. Pest Leafl. U.S. For. Serv.* No. 28, 1958. pp. 4. 6 refs.

Deals mainly with needle-cast caused by *Hypoderma lethale*.

Other Diseases caused by Fungi or Bacteria

2027. HEPTING, G. H. **Southern cone rust.** *For. Pest Leafl. U.S. For. Serv.* No. 27, 1958. pp. 4. 4 refs.

Symptoms, damage, cause, and control, of a disease caused by *Cronartium strobilinum* on Southern Pines. [Cf. *F.A.* 20 No. 2078.]

444. Virus Diseases

See also No. 1990.

2028. IYENGAR, A. V. V. **Spike disease of Sandal—a retrospect.** *Indian For.* 84 (10), 1958 (603–12).

Reviews the history of research into, and the present state of knowledge of, the disease, with some recommendations.

45. Damage by Animals

451. Mammals

See also Nos. 1418–20, 1757–8, 1796, 1834.

2029. JONES, M. B., and LONGHURST, W. M. **Overhanging deer fences.** *J. Wildlife Mgmt.* 22 (3), (325–6). B.A.P.

Tests were made of sloping fences at the Hopland Field Station, Calif. (1) A 2-ft. vertical wire-mesh section surmounted by a 6-ft. section sloping at 25° in the direction of the deer pressure (alternatively 4 ft. and 4 ft. respectively) proved successful against both deer and sheep. A disadvantage was the cost of the double row of steel posts. Total cost was ca. $1,700/mile. (2) A 6-ft. roll of chicken wire staked at its lower edge was set at an outward angle of ca. 49°. Total cost was ca. $1,000/mile. Both fences are effective in one direction only, though in (1) the vertical section may be heightened to exclude sheep on both sides.

2030. WEBB, W. L. **Interpretation of overbrowsing in northeastern forests.** *J. Wildlife Mgmt.* 21 (1), 1957 (101–3). 11 refs. B.A.P.

A brief review of the effects of deer browsing on forests, based on literature produced between 1937 and 1956 inclusive.

2031. STOECKELER, J. H., STROTHMANN, R. O. and KREFTING, L. W. **Effect of deer browsing on reproduction in the northern hardwood/Hemlock type in northeastern Wisconsin.** *J. Wildlife Mgmt.* 21 (1), 1957 (75–80). 5 refs. B.A.P.

Four deer-proof enclosures [varying in extent] were established between 1946 and 1949 in northern-hardwood/Hemlock stands of the Nicolet National Forest in N.E. Wisconsin, and 3–4 counts were made over a period of 5–8 years, to assess the value of complete protection from browsing and to study the rate of recovery. It is concluded that a period of 6–8 years of low deer population is needed in such second-growth stands to permit successful regeneration. Although Sugar Maple regeneration is known to withstand rather heavy deer browsing for many years without much mortality, seedlings repeatedly browsed become stunted and malformed and recover rather slowly, even with subsequent complete protection. *From authors' summary.*

2032. GRUNDT, L., and SJØLIE, P. En undersøkelse av elgskadene i Stor-Elvdal. [**A study of elk damage in Stor-Elvdal.**] *Tidsskr. Skogbr.* 66 (3), 1958 (140–58). 11 refs. [Nor.]

Earlier literature is discussed and results of investigations on damage to Pine in 9 areas in Stor-Elvdal in 1955–56 are presented. They include the following: Undamaged plants formed the largest number, but were confined mainly to height class 1 (0·5–1 m.). Nearly all plants in height classes 3 and 4 (2–3 and > 3 m. respectively) were damaged, but damage in class 4 was confined to browsing of side shoots, and was not serious. Total damage (i.e. damage so serious that the trees would be unlikely to survive) amounted to 7·6% of all trees, mostly in class 3. Of the damaged trees, 8% (4·7% of the total number) showed barking. The most frequent form of damage was to the top shoot (62% of the damaged trees), found mainly in class 2 (1–2 m.).

Over 75% of undamaged trees in both years occurred in class 1; in classes 2 and 3 the % suffering top and total damage had increased in 1956, the % suffering side-browsing had decreased, and damage generally was higher than in 1955, when the snow was not so deep. From the number of trees found to be damaged, an attempt is made to estimate the damage in a young stand during the 10-year period when the trees are between the heights of 0·5 and 3 m., after which height the risk of serious damage is considered slight. The total number of trees lost during the period is estimated at 28,600 and of those lost or damaged at 63,290. A graph is presented showing the smallest browsing area per elk, in Pine regeneration 0·5–5 m. high and for various original plant densities, to ensure that the blank squares when the stand is 5 m. high will not exceed 25%. The results will not necessarily be valid for other districts.

2033. UECKERMANN, E. Untersuchungen über die Ursache des Schälens des Rotwildes. **[The causes of bark scaling by red deer.]** *Zeitschrift für Jagdwissenschaft, Hamburg & Berlin* 2 (3), 1956 (123–31). 8 refs. [G.g.e.f.] B.A.P.

Discusses summer and winter barking, species chosen, dependence on site and population densities of the deer, causes of barking, nutrient value obtained, and control of deer populations to keep injury at a low level.

2034. KRYSZTOFIK, E. O zdolności regeneracyjnej modrzewia i praktycznym jej wykorzystaniu w hodowli. **[Regeneration of Larch and practical measures for treating injured plants.]** *Sylwan* 102 (4), 1958 (38–53). [Pol.pol.russ.e.]

Describes and estimates the rabbit, hare and deer damage to Larch in nurseries and in young, pure and mixed plantations in the Świętokrzyski National Park. In early spring, damaged plants should be cut back obliquely, seedlings ca. 2–3 cm. above the root collar leaving 2 or 3 side buds, older trees in plantations 5–15 cm. above, leaving at least 1–2 healthy and uninjured side shoots. The obliquely cut surface should face north. Wounds heal in 4–5 years, and it is claimed that plants thus treated soon catch up with uninjured plants of the same age. The height increment of Larch of various ages for 2, 3 or 4 years after cutting is tabulated.

2035. UECKERMANN, E. Verhütung von Wildschäden im Walde. **[Control of game damage.]** *Forsttech. Inform., Mainz* 1958 (10), (71–8). 6 refs. [G.]

Recommendations, based on German experience and research, on tolerable densities of red, fallow and roe deer in good, medium and poor habitats, and age and sex ratios; protection of whole areas or individual trees by chemical or mechanical means against rubbing, barking and browsing (including that by hares and rabbits) noting that no repellent for use during the growing season has yet been officially approved; game pastures and winter feeding etc.

2036. CHABRECK, R. H. **Beaver-forest relationships in St. Tammany Parish, Louisiana.** *J. Wildlife Mgmt.* 22 (2), 1958 (179–83). 9 refs. B.A.P.

An investigation was made on plots 0·5 chain wide and 4·5 chains long. Heaviest injury was sustained by Sweetgum, *Magnolia virginiana*, *Pinus glabra* and *Pinus taeda*. Of all plants present on the plots, beaver barked 24% and felled 18%. Those felled were small and of little value to forestry. Pines barked by the beaver were more vulnerable to attack by insects, and increased the hazard of fire damage. Most hardwoods, when barked, became liable to decay. Water impounded behind a beaver dam had killed 20,674 bd. ft. of merchantable Pine. *From author's summary.*

2037. **Wildlife damage to Cypress seedlings.** *Rep. Sth. For. Exp. Sta. 1957*, 1958 (64–5).

Nutria and rabbits have been very destructive to *Taxodium distichum* seedlings in freshwater marshes of Louisiana, uprooting 79–95% of the seedlings or browsing them down, nutria rather than rabbits pulling out the seedlings. So far, no effective repellents have been found.

2038. HAYNE, D. W., and CARDINELL, H. A. **New materials as cottontail repellents.** *Quart. Bull. Mich. agric. Exp. Sta.* 41 (1), 1958 (88–98). 16 refs.

Recommends dosages and methods of application of thiram or z.i.p. in an asphalt/water emulsion or rosin in ethanol for effective control of cottontails (*Sylvilagus floridanus mearnsii*) causing damage to trees in Michigan. [Cf. *F.A.* 17 No. 4124.]

2039. EIBERLE, K. Über den Wirkungsgrad chemischer Verbissschutzmittel. **[The efficacy of chemical browsing repellents.]** *Schweiz. Z. Forstw.* 109 (10), 1958 (592–5 + 6 photos). [G.f.]

In dense natural regeneration of Silver Fir browsed by roe deer (density 12–14/100 ha.) none of 3 preparations applied to (*a*) leading shoots and (*b*) top whorls, of 36 evenly spaced plants on a 100-sq.-m. plot proved satisfactory, though one, a paste applied by hand, gave full protection to (*a*) for 5 months, and reduced browsing of (*b*) by ca. two-thirds. None acted as a repellent beyond the shoots actually treated.

2040. **Grazing effect studies.** *Rep. Sth. For. Exp. Sta. 1957*, 1958 (60–1).

Of 7 repellents sprayed on Slash Pine seedlings in Louisiana just after planting, while all were partly effective, two, ZAC (zinc-dithiocarbamate-amine complex) and $CuCO_3$ plus asphalt emulsion gave reasonably good protection against cattle browsing. Studies in Alabama indicated that establishment and first-year survival of Longleaf Pine was not much affected by cattle, but later, significant differences in stocking of grazed and ungrazed plots developed.

2041. Die Wärmesabsorption eines dunkelfarbigen Wildschadenverhütungsmittel. **[Heat absorption of a dark-coloured game repellent.]** *Allg. Forstzeitschr.* 13 (33), 1958 (462–3). [G.g.]

Measurements with a thermo-couple (chrome-nickel and constantan) on Beech stems coated with a black repellent and irradiated with an artificial daylight lamp showed considerably greater absorption values and rises in temperatures than on untreated controls. Dark preparations could therefore be dangerous where the possibility of sunscorch exists.

2042. VÖLKER, W. Über die Wärmeleitfähigkeit eines dunklen Wildschadensverhütungsmittels. **[Heat conductivity of a dark-coloured game repellent.]** *Allg. Forstzeitschr.* 13 (34), 1958 (479). 1 ref. [G.]

[Cf. preceding abstract.] The rise in temperature was confined to the side irradiated, so that the danger of bark injury is local.

452. Birds

See Nos. 1746, 1756.

453. Insects

See also Nos. 1343, 1348, 1495, 1610, 1847.

2043. KOEHLER, W. Występowanie szkodliwych owadów w okresie powojennego dziesięciolecia. **[Occurrence of harmful insects [in Poland] in the post-war decade.]** *Sylwan* 102 (4), 1958 (18–37). 1 ref. [Pol.russ.e.]

A fairly detailed account of the outbreaks, which were promoted by forest neglect during the war, by wartime damage, and by abnormal weather during the period, is given in the 2-page English summary.

2044. **A status report on forest insect conditions in the United States in 1957.** *FAO Plant Prot. Bull.* 6 (9), 1958 (134–46).

Covers conditions (*a*) by regions of the U.S.A., and (*b*) by the major insect pests.

2045. CHELLMAN, C. W. **Miscellaneous insect enemies of Southern Pines.** *Southern Forest Pest Reporter, Southern Forest Experiment Station, New Orleans* No. 21, 1958. pp. 14.

Briefly summarizes published and unpublished information on *Colaspis pini*, *Monochamus titillator*, *Buprestis apricans*, *Tetralopha robustella*, *Platypus* spp., *Exoteleia* sp., *Retinodiplosis* sp., *Phenacaspis* and *Toumeyella* sp., aphids and spider mites.

2046. SCHUDER, D. L. **Some new insect pests of trees and shrubs in Indiana.** *Proc. Indiana Acad. Sci.* 67, 1957 (1958), (145–9). 11 refs. L.S.

Describes briefly, with notes on life history and damage, *Dioryctria zimmermani*, *Homadaula albizziae*, *Agrilus difficilis*, *Pantomorus godmani*, *Phytomyza ilicis*, *Physokermes piceae*, *Spilococcus juniperi*, *Trachycoccus hyperici* and *Fiorinia theae*, found in recent years in Indiana.

2047. MICHELBACHER, A. E., and ORTEGA, J. C. **A technical study of insects and related pests attacking Walnuts [in California].** *Bull. Calif. agric. Exp. Sta.* No. 764, 1958. pp. 86. 113 refs.

2048. SCHIMITSCHEK, E. Folgen der Einbringung fremder Holzarten im Nordwestdeutschen (besonders küstennahen) Raum. **[Consequences of introducing foreign species into the N.W. (and particularly the coastal) region of Germany.]** *Ber. Tag. nordwestdtsch. Forstver., Oldenburg 1957* [1958] (26–63). 24 refs. [G.]

Seeks to show that ecological and biocoenotic factors make trees planted outside their natural habitat highly vulnerable to primary pests, and, particularly as a result of premature ageing, to the attacks of secondary pests and fungi. In part I, the insect and fungus enemies of *Larix decidua* and *Picea abies*, particularly those of little or no importance in the species' natural habitats, are discussed, and results are given of an investigation into the relation of site factors to the severity and frequency of primary-pest outbreaks in 22 forest districts of the Lüneburg area. These show that the chief sufferers from attacks by *Lymantria monacha*, *Bupalus piniarius*, *Panolis flammea* etc. are pure plantations of Spruce and Pine (here also considered foreign on plant-sociological and ecological grounds) on sites with a low water-table. In part II the role of secondary pests as natural colonizers of ageing and dying trees and the connexion between ageing (and also other physiological processes) and osmotic pressure etc. are discussed. Measurements of evaporation in Sitka Spruce stands in Schleswig-Holstein showed very high mean and maximum values due to the prevalence of high winds, and this difference in transpiration conditions compared with the natural home of Sitka Spruce in the W. American fog belt is considered to be a chief cause of high susceptibility to *Dendroctonus micans* and other secondary pests and pathogens. Measurements of the course of evaporation, transpiration and velocity of the transpiration stream in 10- to 45-year Sitka Spruce, both healthy and of reduced vigour, and of healthy Norway Spruce are presented. Sap-stream velocity and transpiration were greater in Sitka than in Norway Spruce of the same age, and tended to decrease with age more rapidly in Sitka, where values measured at 40 years were surprisingly low. Trees of poor vigour either showed a very low midday peak or dropped very steeply after it. Measurements of the electrical resistance of the cambium in Sitka and Norway Spruce showed high resistance in youth, generally falling with age, with higher values for vigorous trees than for trees weakened by pests or fungi, and lower values for parts of a tree attacked by *D. micans* than for healthy parts.

2049. FOZZER, F. Su alcuni insetti parassiti del larice nei boschi della Vigolana. **[Some insect parasites of Larch in the woodlands of Vigolana, Trento.]** *Monti e Boschi* 9 (11), 1958 (593–602). 20 refs. [It.f.e.]

The most important of the insects studied were *Coleophora laricella*, *Semasia diniana* and *Lygaeonematus laricis*; for all of these, the life cycle differs from that usually ascribed to them, and the second two appear to have 2 generations a year, not one. None of these species is present in epidemic proportions, and the author claims this as a proof that the environment is in a state of equilibrium.

2050. GYÖRFI, J. Nadelholzzapfen- und Nadelholzsamenschädlinge und ihre Parasiten. **[Cone and seed pests of conifers and their parasites.]** *Acta Agronomica Academiae Scientiarum Hungaricae, Budapest* 6 (3/4), 1956 (321–73). 56 refs. [G.g.russ. e.] A.P.B.

Presents notes on a considerable number of insects bred in Hungary from cones of 24 species, 9 native to Europe, 2 to Asia and 13 to N. America.

2051. KEEN, F. P. **Cone and seed insects of Western [U.S.] forest trees.** *Tech. Bull. U.S. Dep. Agric.* No. 1169, 1958. pp. 168. 80 refs.

The bulletin is arranged in two parts: (1) under tree genera and species, with keys to seed and cone insects for each genus; (2) under insect pests, arranged systematically, with notes on life history, damage, hosts, distribution etc. There is also a brief section on control.

2052. COLE, D. E. **Aerial application of benzene hexachloride for the control of cone insects on a Slash Pine seed production area.** *J. For.* 56 (10), 1958 (768).

Results of 1957 trials were encouraging. It is hoped to get better results by spraying ca. 10 days before pollination and again about a week after.

2053. **Defoliation of Eucalypts.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1956/57*, 1957 (67).

Because of the great variation in the attractiveness of Eucalypts to defoliating insects, studies are being made of the host specificities of the most important defoliators. Preliminary surveys suggest that the attractive factors present in host trees may be transmitted in varying degrees to their hybrid progeny, and hybrids have been produced that are relatively free from insect damage. The use of such hybrids in plantations may offer a partial solution of the defoliation problem.

2054. HENSON, W. R. **The effects of radiation on the habitat temperatures of some Poplar-inhabiting insects.** *Repr.* from *Canad. J. Zool.* 36, 1958 (463–78). 10 refs.

The relationship between habitat temperature, ambient temperature, and radiation on leaves of *Populus tremuloides* is shown to vary with insect species. The relationships are described for *Cecidomyia* spp., *Cacoecia conflictana*, *Compsolechia niveopulvella*, *Phyllocnistis populiella*, *Chaitophorus populifolia*, and *Agromyza schineri*. The possible ecological significance of the findings is discussed.

Insects: Natural and Biological Control

See also Nos. 1411–2, 1416, 2070, 2076, 2081, 2083, 2087–9, 2091, 2104–7, 2113, 2116–7.

2055. PANŠINA, E. I. Opyt ocenki poleznoj dejatel'nosti nekotoryh nasekomojadnyh ptic v gnezdovoj period v sosnovyh nasaždenijah lesostepi. **[Assessing the usefulness of some insectivorous birds during the nesting season in Pine stands of the forest-steppe.]** *Trudy Vsesojuznogo Instituta Zaščity Rastenij, Leningrad* No. 11, 1958 (52–73). 28 refs. [Russ.] O.R.E.

Studies were made in Voronezh province, in Pine plantations 20–35 years old, with or without a small proportion of Birch and Oak, of the insects fed by (*a*) *Phoenicurus phoenicurus*, (*b*) *Muscicapa albicollis*, and (*c*) *Parus major*, to their nestlings. The numbers and proportions of the different insects taken are tabulated for all three species. Spiders (37·7%) and imagos of Lepidoptera (30·9%) formed the bulk of the diet of (*a*); for (*b*), spiders made up 33% and imagos of Lepidoptera 32·5%. For (*c*), spiders formed 29·2%, and larvae and imagos of Lepidoptera respectively 26·4 and 34·6% of the diet; (*c*) was the most useful species, eating large numbers of *Bupalus piniarius* imagos and *Dendrolimus pini* larvae.

Insects: Chemical Control (General)

See also Nos. 1720, 1911–2, 1981, 2052, 2066–7, 2074, 2077, 2080, 2089, 2092, 2096, 2098–9, 2101, 2108–9, 2111–2, 2118.

2056. WACHTENDORF, W. Über den Einfluss einiger Insektizide auf in Gallen lebende Insektenformen. **[The influence of some insecticides on insects living in galls.]** *Forstwiss. Cbl.* 77 (9/10), 1958 (279–86). 6 refs. [G.g.]

Systox (*a*), Metasystox (*b*), and Dipterex emulsion (*c*), were sprayed in high concentration (usually 1–2%) against a number of gallicolous insects, but as such concentrations of (*a*) are dangerous to human life, the use of (*b*) and (*c*) alone is recommended. Details are given of the efficacy of the preparations against insects causing woody branch galls, shoot galls, resin galls, bud galls and leaf galls. The insects of importance to forestry were *Saperda populnea*, *Cryptorrhynchus lapathi*, *Ernarmonia zebeana*, *E. pactolana* and *Dasyneura laricis*.

2057. Invloed insecticiden op de bodemfauna. **[The effect of insecticides on the soil fauna.]** *Meded. Inst. toegep. biol. Onderz. Nat.* No. 38, 1958 (18–9, 31). [Du.e.]

Tabulates the results of experiments on the effect of parathion, aldrin, dieldrin, lindane, heptachlor, chlordane and D.D.T., in the form of emulsions or powders, applied in the soil or by direct contact, on *Polyphylla fullo*, *Lumbricus rubellus* and *Tipula paludosa*.

2058. BARKER, R. J. **Notes on some ecological effects of DDT sprayed on Elms.** *J. Wildlife Mgmt.* 22 (3), 1958 (269–74). 14 refs. B.A.P.

In the spring following the spraying of Elms with 6% DDT on 430 acres at Urbana, Ill., 21 dying robins [*Turdus migratorius*] were found. Analyses of leaves, soil, earthworms and robins suggested that 3 mg. of DDT can be accumulated by fewer than 100 earthworms. This was, roughly, the mean concentration found in dying robins in this study. The importance of such concentrations of toxins should be taken into account when assessing long-term biological effects. *From author's summary.*

2059. HOFFMAN, R. S., JANSON, R. G., and HARTKORN, F. **Effect on grouse populations of DDT spraying for Spruce budworm.** *J. Wildlife Mgmt.* 22 (1), 1958 (92–3). 5 refs. B.A.P.

Following 1 lb./acre applications of DDT, an attempt was made to measure the effects on 3 species of grouse in Montana. Counts were made of adult birds and of broods before, during, and 1 year after spraying, in sprayed and unsprayed areas. A study of age ratios was also made. The evidence indicates that application of DDT at this rate is not immediately harmful to grouse populations; nor were grasshoppers, a staple item in the diet of blue grouse, noticeably reduced in numbers by the spraying. *From authors' summary.*

Orthoptera

2060. **Stick insects.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1956/57*, 1957 (67).

Kentromorphic phase differences, similar to those in locusts, have been shown to occur in the 3 species of stick insects (Phasmatidae) that damage Eucalypt forests in eastern Australia [cf. *F.A.* 18 p. 583]. Recognition of the phases is likely to be of value in forestry practice, since it enables the density level of a given infestation to be estimated from the appearance of a small sample of specimens collected by untrained personnel.

2061. **Direct seeding complicated by cricket damage.** *Rep. Sth. For. Exp. Sta. 1957*, 1958 (12–3).

A short-tailed cricket, *Anurogryllus muticus*, has been found to clip off newly germinated Slash and Longleaf Pine seedlings in Louisiana, causing losses of 20–95%, with losses much greater in disked strips than on grass 'roughs'. It has been recorded throughout the Atlantic and Gulf Coastal Plains, and from Texas and S. Arkansas.

Isoptera

2062. **Termites in forest trees.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1956/57*, 1957 (66).

Investigations in hardwood forests near Canberra have shown that the presence of a large colony of *Coptotermes frenchi* increased temperature within the infested tree, compared with a sound tree, by as much as 40° F. in the colder weather.

2063. GARCIA, M. L. **A case of termite damage to a living Avocado tree.** *For. Leaves, Philippines* 10 (3), 1958 (25–7). 3 refs.

Describes attack by *Neotermes malatensis*, a damp-wood termite, beginning at the stub of broken branches and extending upward into living branches. A hollow portion at the base of the stem was infested by *Macrotermes gilvus*, a subterranean termite.

Thysanoptera

2064. TAPIA, E. A. Un trips que ataca las inflorescencias del eucalipto. **[A thrips attacking inflorescences of Eucalypts.]** [*Pap.*] *Ias. Jorn. argent. Eucalipto Asoc. for. argent.* No. 235–200, 1957. pp. 1. [Span.]

Isoneurothrips australis found in Buenos Aires and new to South America.

Hemiptera

See also Nos. 1409, 2054.

2065. JOHNSON, N. E., and HEIKKENEN, H. J. **A method for field studies of the Balsam woolly aphid.** *J. econ. Ent.* 51 (4), 1958 (540–2). 5 refs.

Describes a method of setting up a binocular dissecting microscope (eyepiece, ×9 with 1 mm. co-ordinate grid; objective, ×2), with flash-lamp and locating bracket so that the development of up to 200 stationary wingless sistens of *Chermes piceae* on the bark of *Abies amabilis* can be accurately observed throughout the season, at mapped positions on a plot 0·5 × 0·5 cm.

2066. MILLIRON, H. E. **Economic importance and control of the Loblolly mealybug *Dysmicoccus obesus* Lob.** *J. econ. Ent.* 51 (4), 1958 (555–6).

This insect, found heavily infesting 15-year ornamental Pines in Delaware, feeds under the bark scales on the outer cambium up to 4 ft. from the ground. Affected trees are conspicuous from the white powdery deposit, their spindly appearance, sparse and discoloured foliage, shorter stem and, in the worst case, swollen base. Of at least two species of associated ant, one was *Lasius alienus americanus*. Spraying the whole tree, with special attention to the base, with 55% emulsifiable concentrate of malathion (2 tablespoons/gal.) at 50 lb./sq. in. on 31 March appeared to be 100% effective in one week, and no living insects were seen in the following 6 weeks.

Lepidoptera

See also Nos. 2014, 2048–9, 2054–6, 2118.

2067. ANFINNIKOV, M. A. Ispytanie kontaktnyh himikatov protiv drevesnicy v"edlivoj (*Zeuzera pyrina* L.). **[Testing contact insecticides against *Z. pyrina*.]** *Bjulleten' naučno-tehničeskoj Informacii, UkrNIILHA, Har'kov* No. 1, 1956 (23–5). [Russ.]

Tabulates the results of tests with several different sprays and dusts of Russian manufacture.

2068. MARTIN, J. L. **A note on *Exoteleia dodecella* L.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (4), 1958 (2).

A recent survey has shown that *E. dodecella*, a European Pine bud-moth, is common in central and eastern Ontario. The preferred hosts are *Pinus sylvestris* and *P. mugo*, but *P. nigra* var. *austriaca*, *P. strobus* and *P. banksiana* are also attacked when growing near heavily infested stands of these.

2069. ROMANYK, N. Nueva plaga en los pinares de Guadarrama. **[A new pest in the Pine forests of Guadarrama.]** *Bol. Serv. Plagas for., Madrid* 1 (1), 1958 (7–11 + 2 plates). [Span.]

Notes on the biology and life history of the needle-miner *Ocnerostoma piniariella*, newly appeared, but not yet widespread, in Guadarrama.

2070. CEBALLOS, G. Una especie nueva de Ichneumonidae, parásito de *Ocnerostoma piniariella*. **[A new ichneumon species, parasite of *O. piniariella*.]** *Bol. Serv. Plagas for., Madrid* 1 (1), 1958 (13–6). [Span.]

Describes *Herpestomus neirae*, raised from pupae of *O. piniariella*.

2071. DENTON, R. E. **The Larch casebearer in Idaho—a new defoliator record for Western forests.** *Res. Note Intermt. For. Range Exp. Sta.* No. 51, 1958. pp. 6. 4 refs.

Notes on the morphology and life history of *Coleophora laricella*, and on the damage caused by an outbreak in 1957 over 15,000 acres of Larch-type forests in Idaho. The necessity for research on control methods is pointed out.

2072. **Young Cottonwoods damaged by twig borer.** *Rep. Sth. For. Exp. Sta. 1957*, 1958 (15).

A twig borer, tentatively identified as *Gypsonoma* sp., probably *haimbachiana*, severely injured the terminals of young Cottonwoods in the Mississippi region, causing stunted bushy growth. The overwintering larvae enter the twigs in early spring. Several generations may develop in one year.

2073. MARTÍNEZ, A. Algunos datos sobre la 'polilla' de la semilla del pino misionero. **[Some data on the 'seed moth' of Parana Pine.]** *Rev. Invest. for., B. Aires* 1 (4), 1957 (35–7). [Span.]

Some preliminary data are given on infestation of *Araucaria angustifolia* seed by a pest presumed to be *Laspeyresia araucariae*. A more detailed study of area of dispersal and degree of infestation in Argentina is to be published later.

2074. SCHWERDTFEGER, F., and JÄGER, A. Versuche zum Flugzeugeinsatz im Forstschutz. I. Bekämpfung des Kiefernknospentriebwicklers *Evetria buoliana* Schiff. **[Trials of forest protection from the air. I. Control of *Rhyacionia buoliana*.]** *Forst- u. Holzw.* 13 (20), 1958 (410–1). 1 ref. [G.]

In trials, 3 kg. DDT/ha. was applied as an emulsion and a suspension, at 40 and at 80 litres/ha. There were no clear differences in effect between the emulsion and suspension, but the 80 litres/ha. treatment proved more effective than the 40. Rates substantially less than 80 litres/ha. are not recommended.

2075. MILLER, C. A. **The measurement of Spruce budworm populations and mortality during the first and second larval instars.** *Repr.* from *Canad. J. Zool.* 36, 1958 (409–22). 19 refs.

Compares two methods of assessing 2nd-instar budworm populations. Collecting foliage samples in spring is preferable to collecting in autumn, and sampling the whole branch as a unit is found to be a satisfactory technique.

2076. THOMSON, H. M. **Some aspects of the epidemiology of a microsporidian parasite of the Spruce budworm, *Choristoneura fumiferana*.** *Canad. J. Zool.* 36 (3), 1958 (309–16 + 1 plate). 9 refs. O.R.S.

Discusses some inherent characteristics of the host and of the parasite, which influence the latter's incidence in budworm populations.

2077. BROWN, G. S., *et al.* **Black-headed budworm spraying experiments on Vancouver Island, British Columbia.** *For. Chron.* 34 (3), 1958 (299–306). 1 ref.

Results of aerial trials indicate that *Peronea* (*Acleris*) *variana* can be successfully controlled by a DDT oil spray. The best time to begin spraying is when most of the larvae are in the second instar. Larval mortality was more closely related to droplet density than to dosage.

2078. MERKEL, E. P. ***Dioryctria* cone moth attack as related to cone rust of Slash Pine in North Florida.** *J. For.* 56 (9), 1958 (651). 1 ref.

From observations it appears that rust-infected Slash Pine conelets are very attractive food for the larvae of *D. abietella* and *D. amatella* in the spring, and that controlling the cone rust may also substantially reduce the damage to second-year cones by insects.

2079. BELOV, S. V. Bereč' lesa. **[Preserve the forests.]** *Priroda, Moskva* 47 (7), 1958 (55–8 + 2 plates). [Russ.] A.P.B.

Discusses the extent of damage caused in recent years by outbreaks of *Dendrolimus sibiricus* to the belt of forest (*Picea obovata*, *Abies sibirica*, and *Pinus sibirica*, with some Birch and Aspen), between the Ob and the Yenisei rivers, Siberia, and describes an aerial survey made in 1957 over the Chulym River basin, Tomsk province, to obtain more detailed data on the damage.

2080. GOL'DIN, D. I. Primenenie aviaopryskivanija v bor'be s sibirskim šelkoprjadom. **[Aerial spraying to control *Dendrolimus sibiricus*.]** *Lesn. Hoz.* 11 (3), 1958 (55–6). [Russ.]

Preliminary trials and large-scale control operations (ca. 15,000 ha.) in the Tomsk region showed that spraying a water solution of DDT mineral-oil emulsion gave better control and was cheaper than aerial dusting with DDT.

2081. CLARK, E. C. **Ecology of the polyhedroses of tent caterpillars [*Malacosoma* spp.].** *Ecology* 39 (1), 1958 (132–9). 22 refs.

Tests are reported, demonstrating the transmission of the virus by host-plant contamination and in association with the egg in a natural epizootic of the disease. A hypothesis concerning the transmission of the disease between outbreaks of the host insect, is considered for testing. *From author's summary.*

2082. THOMSON, M. G. **Egg sampling for the western Hemlock looper.** *For. Chron.* 34 (3), 1958 (248–56). 2 refs.

The western Hemlock looper [*Ellopia fiscellaria lugubrosa*] will lay eggs in all parts of a tree, but in the years before heavy defoliation eggs will be found mostly on the bole in the mid-crown. Moss and lichen are the preferred oviposition sites, but many eggs are laid singly in branch crevices. Where $\geqslant$ 10 eggs per $\frac{1}{4}$-sq.-ft. sample of bark are found in the mid-crown, noticeable defoliation may occur in the next summer. *From author's summary.*

2083. **Control of looper moth.** *Rep. N.Z. For. Serv. 1957/58*, 1958 (48).

A recent increase in numbers of *Selidosema suavis* on *Pinus radiata* in Eyrewell Forest, Canterbury, [New Zealand], gave cause for concern, but after building up to epidemic proportions, it subsided as a result of natural control factors. A naturally occurring virus pathogenic to *S. suavis* has been isolated and experiments are being made with it in the laboratory.

2084. RIESGO ORDOÑEZ, A. Notas de ampliación sobre la biología de la *Catocala fulminea* Scop. en los encinares españoles. **[Supplementary notes on the biology of *C. fulminea* in Spanish Oak forests.]** *Bol. Serv. Plagas for., Madrid* 1 (1), 1958 (33–40). [Span.]

2085. STEGER, O. Zur Kieferneulenbekämpfung in Mittelfranken im Jahre 1956. **[Control of**

***Panolis flammea* in Middle Franconia in 1956.**] *Forstwiss. Cbl.* 76 (9/10), 1957 (306–14). 2 refs. [G.]

A more detailed version of work noticed earlier [see *F.A.* 19 No. 4534].

2086. ČURAEV, I. A. K voprosu o vredonosnosti i kormovoj specializacii amerikanskoj beloj babočki (*Hyphantria cunea* Drury). [**The damage caused by *H. cunea*, and its food preferences.**] *Trudy Vsesojuznogo Instituta Zaščity Rastenij, Leningrad* No. 11, 1958 (85–101). 23 refs. [Russ. russ.] O.R.E.

Reviews Russian, European and N. American literature on *H. cunea*. Fruit trees, *Acer negundo*, *Morus* sp. and *Juglans regia* are the favoured hosts; most forest trees are less seriously attacked, and *H. cunea* has not been reported at all on Horse Chestnut or conifers in the Transcarpathian region.

2087. KOVAČEVIĆ, Ž. Pathogene Mikroorganismen als Begleiter und „Mortalitätsfaktoren des Schwammspinners *Lymantria dispar* L. und des amerikanischen Webebären *Hyphantria cunea* Drury. [**Attendant pathogenic micro-organisms as factors for mortality in *L. dispar* and *H. cunea*.**] *Anz. Schädlingsk.* 31 (10), 1958 (148–50). 9 refs. [G.]

Discusses the influence on population dynamics of pathogenic micro-organisms constantly accompanying the insects. These, in the opinion of the author, are more important (in conjunction with weather and food supply) in bringing about the collapse of outbreaks, and causing fluctuations of populations, than those entering from without. Their influence is more marked with *H. cunea* than with *L. dispar*.

2088. RUPÉREZ CUÉLLAR, A. Sugerencias sobre la lucha biológica contra la *Lymantria dispar* en estado de huevo. [**Biological control of *L. dispar* in the egg stage.**] *Bol. Serv. Plagas for., Madrid* 1 (1), 1958 (41–53). [Span.]

A review of work accomplished in Spain from 1922 to the present day.

2089. ROMANYK, N. Los tratamientos y el parasitismo de *L. dispar* en los encinares de Salamanca. [**Control measures and parasitization of *L. dispar* in the Oak stands of Salamanca.**] *Bol. Serv. Plagas for., Madrid* 1 (1), 1958 (27–32). [Span.]

Presents some details of chemical control measures undertaken throughout 1955–57, and their effect on parasitization during that time. There was no evidence that parasitization was reduced by spraying with 10% DDT.

2090. ENE, M. Observaţii asupra reapariţiei în masă şi a atacurilor insectei *Ocneria monacha* L. (*Lymantria m.* L.). [**Notes on the mass reappearance and attack [in Rumania] of *L. monacha*.**] *Rev. Pădurilor* 1958 (5), (284–7). 6 refs. [Rum.russ.f.g.e.]

2091. Censimento delle popolazioni di *Formica rufa*. [**Taking a census of *Formica rufa* populations.**] *Bollettino ufficiale del Corpo Forestale dello Stato, Roma* 1958 (4), (200–1). [It.]

A brief account of operations by the Italian Forest Service, which include making a study of *F. rufa* populations in the Alps (their distribution, races, types of colony etc.) experimental transplanting of Alpine colonies to sites in the fore-Alps, Apennines and the plains, and diffusion of information on the part played by ants in controlling *Thaumetopoea processionea* by showing a film on the subject.

2092. VIOTTO, F. La lotta contro la processionaria del pino con mezzi chimici. [**Chemical control of *Thaumetopoea pityocampa*.**] *Monti e Boschi* 9 (10), 1958 (565–8). [It.f.e.]

Following the successful use of parathion-based sprays (Fosdit, Tetrafos, Escatox) applied to the nests by back-pack pumps [see *F.A.* 19 No. 711], the author experimented with other poisons in order to find a safer one. Tiogamma E 110 (manufactured by Sipcam, Milan) proved very efficacious, acting as a contact, stomach, and respiratory poison against the insect, without any toxicity to mammals.

Coleoptera

See also Nos. 1410, 1847, 2048, 2056–7.

2093. PASTRANA, J. A. Los insectos del suelo en el cultivo del *Eucalyptus*. [**Soil insects in the cultivation of Eucalypts.**] [*Pap.*] *Ias Jorn. argent. Eucalipto Asoc. for. argent.* No. 239–200, 1957. pp. 8. [Span.]

Notes on the following insects injurious to Eucalypts: (1) larvae of Coleoptera, (2) adult Scarabaeidae, and (3) ants (*Acromyrmex* spp. and *Atta* spp.). Instructions are given for their control.

2094. GAVOTTO, A. L. REMEDI DE. Principales coleópteros que atacan a los eucaliptos. [**Principal Coleoptera attacking Eucalypts.**] [*Pap.*] *Ias Jorn. argent. Eucalipto Asoc. for. argent.* No. 232–200, 1957. pp. 3. [Span.]

An annotated list of species found in Argentina.

2095. DICK, J., and JOHNSON, N. E. **Carabid beetles damage Douglas Fir seed.** *J. econ. Ent.* 51 (4), 1958 (542–4). 7 refs.

Feeding damage by *Harpalus cautus* and the adult insect itself are illustrated. Carabid beetles fed readily on the seed in the laboratory and lots of 20 seeds exposed in the forest suffered 2% damage in 10 days.

2096. KAN, W.-H. [**Investigation on the injury and its control of silver spotted longicorn beetle [*Memanauster chinensis*] to Beef-wood [*Casuarina* spp.]**]. *Bull. Taiwan For. Res. Inst.* No. 58, 1958. pp. 24. 12 refs. [Chin.e.]

Gives data on the life history of *M. chinensis*, which causes considerable damage to *Casuarina* spp. in shelterbelts and windbreaks in Formosa. The larvae bore into the stems, usually near the ground or below the soil surface, and more rarely into the larger branches. *C. equisetifolia* appears to be attacked more than *C. quadrivalvis*, and trees of ca. 10-cm. diam. suffer most. Adult beetles can be caught by hand; the eggs (laid singly under the bark) can be destroyed by hand pressure; and larvae can be cut out of the sapwood, or pulled from their galleries in the heartwood with sharpened iron wires. As these methods are expensive, several chemical control methods have been tried. A 15%

emulsion of dieldrin in 30–35 parts of water is the best. It should be brushed on to the base of the stem, branches being pruned before treatment. Two successive applications are advised when the adult beetles emerge and lay eggs. Ca. 3 gal. dieldrin is required for treating 1 ha. carrying 3500–4000 trees. Heavily infested stems should be submerged in water for a few weeks after cutting, in order to prevent further larval development in storage.

2097. PETROVA, I. A. O formirovanii i razmeščenii očagov *Saperda carcharias* L. v Saval'skom lesničestve. [**The formation and distribution of foci of infestation by *S. carcharias* in Saval'sk forest district.**] *Trudy Vsesojuznogo Instituta Zaščity Rastenij, Leningrad* No. 11, 1958 (74–84). 23 refs. [Russ.] O.R.E.

The author's studies in 1955/56, in Saval'sk forest district, Balashov province, showed that foci of infestation by *S. carcharias* were confined to pure, open plantations of Poplar (several species mentioned) on unfavourable sites; their occurrence could not be related to age of the trees. It is urged that the best defence against attack should be the creation of Poplar plantations with a second storey of other tree species and an underwood of shrubs, on moist rich soils with moving groundwater.

2098. WACHTENDORF, W. Zur Bekämpfung des kleinen Pappelbocks. [**Control of *Saperda populnea*.**] *Allg. Forstzeitschr.* 13 (38), 1958 (552–3). 7 refs. [G.g.]

Field experiments on Aspen stands in Bavaria with Systox, Metasystox, and Dipterex in various concentrations, applied as atomized, directed sprays, indicated that concentrations of 1–2% for Systox and Metasystox (too dangerous with Systox) and 0·5–1% for Dipterex, were required for complete control. Summer or autumn of the flight year was best, but the early spring following it was still possible for treatment.

2099. SPEERS, C. F. **Pales weevil rapidly becoming serious pest of Pine reproduction in the south [U.S.A.].** *J. For.* 56 (10), 1958 (723–6). 9 refs.

Hylobius pales and *Pachylobius picivorus* are attracted from long distances to stored wood, cut-over areas, and burned or wind-damaged stands. The weevils prefer to feed on the bark of self-sown and planted 1- or 2-year seedlings. The following methods of control have proved successful: (1) allowing $\lessdot$ 9 months between felling and planting; (2) immersing the tops of seedlings in insecticide before planting; (3) applying granular insecticide to the soil round each top-dipped seedling; (4) spraying the seedlings and the surrounding soil [cf. *F.A.* 18 No. 1896].

2100. DOMINIK, J. Obserwacje nad rozwojem szeliniaka (*Hylobius abietis* L.) na powierzchni nasłonecznionej i ocienionej. [**Observations on the development of *H. abietis* on sunny and shady sites.**] *Sylwan* 102 (7), 1958 (45–8). [Pol.]

2101. DÄSSLER, H.-G. Zur Wirkungsweise ungesättigter Fettsäureester als Frasslockstoffe beim Fichtenrüsselkäfer (*Hylobius abietis*). [**The mode of action of unsaturated esters of fatty acids as attractants of *H. abietis*.**] *Anz. Schädlingsk.* 31 (10), 1958 (153–5). 5 refs. [G.g.]

[Cf. *F.A.* 18 No. 3122.] The attractant power of such esters, freshly prepared and kept in airtight containers, was tested on *H. abietis* and compared with that of partially oxidized esters. The presence of oxidation products substantially increases the attractant power of the compounds. In practice therefore it is advantageous to expose the attractant substances to atmospheric O in shallow containers for 3–5 days before putting out in the field.

2102. PERTTUNEN, V. **Reactions of two bark beetle species, *Hylurgops palliatus* Gyll. and *Hylastes ater* Payk. (Col., Scolytidae) to the terpene α-pinene.** *Annales entomologici fennici, Helsinki* 23 (2), 1957 (101–10). 18 refs. [E.e.] I.I.E.

The reactions of (1) *H. palliatus*, and (2) *H. ater*, collected from felled Pines, to two concentrations of α-pinene were investigated in the laboratory; (1) was strongly repelled by the higher, and slightly by the lower concentration; (2) was slightly repelled by the higher, and slightly but significantly attracted by the lower concentration. These reactions are in keeping with the condition of the Pine bark from which the insects were collected, viz. (1) from bark that was brown and without resinous smell; (2) from freshly cut logs, with a definite resinous smell. The role played by terpenes in barkbeetle orientation is discussed. *From author's summary.*

2103. BROWNE, F. G. **Some aspects of host selection among ambrosia beetles in the humid tropics of South-East Asia.** *Malay. Forester* 21 (3), 1958 (164–82). 8 refs.

The majority of ambrosia beetle species do not show high specific host selectivity in very mixed tropical rain forest, but the number of highly selective species nevertheless amounts to 30% of known species. Selectivity tends to occur throughout particular genera, and closely related species tend to select the same hosts. Usually, highly evolved groups are more selective than those more primitive. Hosts are normally selected at the level of the botanical family and very few families are affected. Some families, in general highly attractive to ambrosia beetles, have not developed specialized host relationships; others, in which specialized host relationships do occur, may or may not be highly attractive to most ambrosia-beetle species. Under natural conditions, local specialization does not occur, but under special circumstances, e.g. unsuitable conditions of agriculture, ambrosia-beetle species may show high selectivity to even a single plant species. It is possible that all ambrosia beetles are selective in varying degree, as indicated by: obvious preferences; the frequency of occurrence in association of a few species; varying host patterns of the more unselective species; the lack of correlation between abundance and susceptibility to ambrosia-beetle infestation of a plant family; the occasional adoption of local host specialization. Host size selectivity is clearly marked in certain groups, but not in others, and bears no relationship to the botanical aspect of host selectivity. It is concluded that the still unidentified attractant that

draws ambrosia beetles to their host must be of variable, complex or multiple nature to account for general and specific attraction and host size differentiation. *From author's summary.*

2104. OSTMARK, E. **The life history of *Coeloides dendroctoni* Cush., a braconid parasite of the Engelmann Spruce beetle.** *Abstr.* in *Journal of the Colorado-Wyoming Academy of Science, Denver* 4 (9), 1957 (48).

2105. KNIGHT, F. B. **The effects of woodpeckers on populations of the Engelmann Spruce beetle.** *Abstr.* in *Journal of the Colorado-Wyoming Academy of Science, Denver* 4 (9), 1957 (47–8).

Populations of the beetle were determined in samples from 225 infested trees, some measurements being made in parts of the bole protected from woodpeckers and others in parts not so protected. Each tree was classified into one of 5 woodpecker-feeding categories ranging from light to heavy: % beetle survivals arranged in increasing order of woodpecker feeding were 56, 41, 36, 16 and 2. Survival % was not a measure of actual survival because intensities of infestation also varied and the largest number of beetles survived in the moderate feeding category. A regression showed that beetle survival is significantly related to woodpecker feeding and infestation intensities.

2106. NIKITJUK, A. E. Hiščnye i parazitičeskie nasekomye kak reguljatory vredonosnoj dejatel'nosti i rasprostranenija koroedov hvojnogo lesa. **[Predatory and parasitic insects in the control of barkbeetles in coniferous forests.]** *Bjulleten' Moskovskogo Obščestva Ispytatelej Prirody, Otdel Biologičeskij, Moskva* 62 (2), 1957 (51–5). 13 refs. [Russ.russ.e.] N.L.L.

Examination of the galleries of *Ips sexdentatus* and *I. typographus* on Scots Pine and Spruce trees revealed the following Diptera: *Lonchaea seitneri, Medetera infumata, Phaonia laeta* and *Botanobia dubia. L. seitneri* and *M. infumata* were quite important parasites of *Ips* spp., forming ca. 15% and ca. 4·5% respectively of the total number of entomophagous species found in the galleries. The larvae of *P. laeta* and *B. dubia* fed on refuse there, but did not parasitize *Ips*.

2107. THALENHORST, W. Grundzüge der Populationsdynamik des grossen Fichtenborkenkäfers *Ips typographus* L. **[The main population dynamics of *I. typographus*.]** *SchrReihe forstl. Fak. Univ. Göttingen* No. 21, 1958. pp. 126. 80 refs. [G.g.e.]

The paper, which is complementary to Schwerdtfeger's account of the 1946–50 epidemic [cf. *F.A.* 17 No. 3064], and based largely on observations in the same area (S. Harz range), discusses the factors affecting reproduction and the mortality of the various stages, with special reference to the problem of breeding space and intraspecific competition, whereby high initial densities on susceptible material (windthrows etc.) lead to a reduction in the 'multiplication factor', but are necessary if the beetles are to be enabled to colonize healthy trees. The effect of predators and parasites on mortality appears to be more or less compensated by the lessening of intraspecific competition. Birds, mammals, ants and wasps are thought to be of importance in latency periods, if at all. High moisture content of the bark leads to high larval mortality, lack of O being suspected as a cause. There are no signs that epidemics can end by themselves without the destruction of the forest. The course of the epidemic in the area of the Lilienberg (Sieber District), including weather conditions and control measures, is described in some detail. *From author's summary.*

2108. ACATAY, A. Triebfrass von *Phloeosinus armatus* Reitter und *Phloeosinus bicolor* Brull. **[Feeding on shoots by *P. armatus* and *P. bicolor*.]** *Anz. Schädlingsk.* 31 (9), 1958 (129–30). 2 refs. [G.]

Notes on injury to shoots by *P. armatus* found on *Cupressus sempervirens* vars. *horizontalis* and *pyramidalis* near Scutari, and *P. bicolor* found on *Chamaecyparis* spp., *Thuja* spp., *Libocedrus decurrens, Cupressus* spp., and *Juniperus sabiniana* var. *humilis* near Istanbul and in western and southern Anatolia. For the latter, frequent removal of affected shoots and spraying with 5% DDT are recommended.

2109. DOANE, C. C. **Insecticides to prevent the emergence of *Scolytus multistriatus*.** *J. econ. Ent.* 51 (4), 1958 (469–71). 5 refs.

Slight moistening of infested Elm bark in the laboratory with sprays of 12, 6, and 6% DDT, dieldrin and lindane respectively, reduced larval emergence by 22, 51 and 97% respectively. Daily readings showed that 41, 5 and 1% respectively of the treated beetles survived 24 hours after emerging. Field tests using these sprays and malathion at 0·25–1% to drench the bark of logs infested with larvae or pupae, gave better penetration for all sprays. Lindane and dieldrin (0·5–1%) reduced emergence very effectively, DDT less so and malathion least. In no tests was development into imagos prevented.

2110. ALLEN, A. A. ***Trypophloeus asperatus* Gyll. (Col., Scolytidae) in Kent and Dorset.** *Ent. mon. Mag.* 94 (1132), 1958 (216).

Two records, believed to be the first for the two counties, of the finding of this rare *Populus*-feeding barkbeetle.

2111. MOORE, G. Observaciones sobre ataques del escarabajo negro del trigo (*Dyscinetus gagates*) en plantaciones forestales. **[Attack of the black wheat beetle, *D. gagates*, in forest plantations.]** *Rev. for. argent.* 2 (3), 1958 (90–2). 1 ref. [Span.]

In spring of 1957 a mixed plantation (largely *Populus* × *euramericana* cv. 214), established in the previous July in Buenos Aires province, was almost totally destroyed by *D. gagates* attacking the roots. The plantation was on agricultural land that had previously been under wheat, and in addition the young trees had been weakened by a spring drought. Such attacks may be prevented by incorporating insecticides (such as dieldrin, aldrin, chlordane etc.) into the soil before planting [cf. *F.A.* 8 No. 2135].

2112. ZDRAJKOVSKAJA, A. M. Aviahimbor'ba s pestrym hruščom v Hrenovskom boru. **[Chemical control of *Polyphylla fullo* from the air in the Khrenovoe district.]** *Lesn. Hoz.* 11 (1), 1958 (40–3). [Russ.]

Adults of *P. fullo* on Scots Pine were treated in the flight period with (*a*) 12% BHC dust (20 kg./ha.), (*b*) 5·5% DDT dust (20 kg./ha.) or (*c*) 5% DDT mineral-oil emulsion (500 litres/ha.). A kill of 98·9% was achieved with (*a*), 25·1% with (*b*) and 39% with (*c*). The effectiveness of the dusting gradually decreases, and in view of the prolonged flight period of this species, a second treatment will be necessary on areas where the population again builds up.

Hymenoptera

See also No. 2049.

2113. RUPPERTSHOFEN, H. Erfahrungen über einen kombinierten biologischen Forstschutz durch die kleine rote Waldameise, waldbrütende Vögel, Fledermäuse und Waldspinnen. **[Experience with combined biological control [of *Pristiphora abietina*] by *Formica rufa*, forest birds, bats, and forest spiders.]** *Waldhygiene* 2 (7/8), 1958 (252–7). [G.]

Reports on experiments over the last 8 years in the municipal forest of Mölln, where 1000 ha. (largely pure Spruce) are protected against *P. abietina* by ant colonies (now ca. 850 nests). The ants further attracted many birds, other insects, lizards and spiders. Experiments with spiders as a control factor are in progress.

2114. GHENT, A. W., and WALLACE, D. R. **Oviposition behaviour of the Swaine Jack Pine sawfly [*Neodiprion swainei*].** *For. Sci.* 4 (3), 1958 (264–72). 8 refs.

[Cf. *F.A.* 17 No. 91; 18 No. 1923.] Binomial calculations satisfy the observed distribution of eggs on both, one, or neither of the pair of needles in a single sheath, and refute the statement that this sawfly lays its eggs in pairs. Oviposition takes place as close as possible to the apical edge of the basal sheath, subsequent growth of the needle carrying the egg slit away from this position but maintaining its distance from the needle tip. The behaviour of this species is thus essentially the same as that of *N. hetricki*. The avenues of speciation of these two species and of *N. exitans* and *N. pini-rigidae*, in relation to host Pines and behaviour, are discussed.

Diptera

See also Nos. 2054, 2056.

2115. POSTNER, M. Die Tannennadel-Gallmücke *Agevillea abietis* Hub. (Cecidomyidae, Diptera), ein beachtenswerter Schädling an Jungtannen. **[*A. abietis*: a noteworthy pest on young Silver Fir.]** *Forstwiss. Cbl.* 76 (3/4), 1957 (89–95). 6 refs. [G.]

[Cf. *F.A.* 19 No. 4581.] A fuller account, including results of investigations on the extent of damage.

2116. MILLER, W. E. **Ecological notes on the Pine midges *Retinodiplosis resinicola* (Osten Sacken) and *R. inopis* (Osten Sacken) in southern Ohio.** *Ohio J. Sci.* 58 (4), 1958 (231–5). 4 refs. C.G.B.

Notes on incidence, type of injury, life history, parasitization and annual fluctuations of populations.

2117. BÉIQUE, R., and BOUCHARD, P. **Observations on a new Poplar leaf miner, *Phytagromyza populicola* (Hal.).** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (4), 1958 (1).

This European species was first noted in N. America in 1956 in Quebec and has since been found all over the S.E. part of the province, mining the leaves of *Populus nigra* var. *italica* (its preferred host), *P. deltoides*, *P. tremuloides*, and *P. grandidentata*. Some notes are given on its behaviour and parasites.

459. Other Animals

2118. JOHNSON, P. C. **Spruce spider mite infestations in northern Rocky Mountain Douglas-Fir forests.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 55, 1958. pp. 14. 21 refs.

Presents data on the life history, hosts, damage, occurrence and control of *Oligonychus* [*Paratetranychus*] *ununguis*, of which epidemic outbreaks occurred in 1957 over large areas of Douglas Fir in Montana and S. Idaho. The infested forests were in areas that had been aerially sprayed with DDT in 1956 to control the Spruce budworm, and an apparent relationship between outbreaks of *O. ununguis* and the use of DDT, which while harmless to the spider mite is toxic to its predators, is discussed.

46. Damage by Man

See also No. 1379.

2119. MARCELO, H. B., and TAGUDAR, E. T. **Residual stand in selective high-lead logging.** *Philipp. J. For.* 12 (3/4), 1956 (1958), (101–16 + 3 gphs., 4 photos).

A study of damage to the residual stand in Dipterocarp forest, selectively logged with high-lead yarding, leads to a number of recommendations, e.g. use of wedges to control direction of fall, avoidance of side-hill yarding by careful location of spar trees, better training of crews, fines for unnecessary damage, discouragement of single-man felling.

48. Injuries Due to Unknown or Complex Causes

See also No. 1990.

2120. TIMOFEEV, V. P. Pričiny usyhanija hvojnyh lesov Podmoskov'ja i meroprijatija po ih vosstanovleniju. **[Causes of dieback in coniferous forests round Moscow and measures for the rehabilitation of the forests.]** *Doklady Moskovskogo Sel'skohozjajstvennoj Akademii im. K. A. Timirjazeva, Moskva* No. 29, 1957 (292–9). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (4), (No. 15342). [Russ.] H.S.B.

Near the suburbs and industrial centres of Moscow province, tree growth suffers from soil compaction, destruction of young growth, and raising of the water table. In the coniferous forests, Pine and Spruce of the older age-classes show dieback and shed their older needles 1–3 years earlier than is normal. Among the conifers, Larches (*Larix sukaczewii*, *L. sibirica*, *L. decidua*) grow better than Pine or Spruce (except on sands or waterlogged soils) and are resistant to drought, frost, air pollution, diseases and insect pests.

2121. TOMAŠEVSKI, S. U kojim debljinskim razredima i na kojim ekspozicijama dolazi najveći broj sušaca i izvala kod jele. [**The diameter classes and aspects with most dieback and windthrow of Silver Fir.**] *Šum. List* 82 (7/9), 1958 (278–81). [Croat.e.]

At Ravna Gora in the Karst region of Jugoslavia, windthrow and dieback in 1956–57 were commonest on warm, i.e. W., S.W., S. and S.E., aspects. The 21- to 30-cm. diam. class had most windthrown trees, the 31- to 61-cm. classes the most dieback.

2122. MORIONDO, F. Su di una anomalia vegetativa del cipresso. [**Anomalous growth in *Cupressus sempervirens*.**] *Ital. for. mont.* 13 (4), 1958 (141–4). [It.it.f.]

Describes in detail a disorder occurring in young Cypress trees in Tuscany, in which elongation of the apical shoot is reduced and its radial growth increased, elongation of lateral shoots is increased, bark is thickened and fissured, and the tips of shoots bend over at right angles or even further. It is considered likely that the condition is due to a virus infection, and further investigations are to be made.

2123. **Death of Pines.** *Rep. Dep. sci. industr. Res. N.Z. 1957/58*, 1958 (31–2).

Over a period of many years there has been a history of periodic tree death in shelterbelts throughout New Zealand, but particularly in the North Island. The trees affected are *Pinus radiata*, *P. muricata*, *Cupressus macrocarpa* and *Chamaecyparis lawsoniana*. High mortality usually follows wet winters. Recent work by the Plant Diseases Division has shown that the death of Pines in shelterbelts is associated with the presence of *Phytophthora* spp. in the soil. Three species of *Phytophthora* have been isolated from soils in the vicinity of diseased trees, and all have been shown to be pathogenic to Pine rootlets. Examination of root systems of infected trees has shown that attack by these fungi is practically confined to rootlets. Infection is favoured by high soil moisture, under which condition many rootlets are killed. New rootlets are then formed, and if soil moisture becomes less, trees recover. If, however, soil moisture remains high, more and more rootlets are killed, and when transpiration becomes high with the onset of warm weather, trees die from physiological drought brought about by lack of rootlets. In free-draining soil or on slopes, trees do not die after wet winters, although *Phytophthora* is present in the soil. In connexion with this investigation, the Auckland Industrial Development Laboratories have developed a method of measuring sap flow by means of heat transport. An instantaneous line-pulse of heat is released in the sapwood by passing an electric current through a resistance wire perpendicular to the sap stream, and the consequent temperature changes at a point $\frac{1}{2}$ in. downstream are measured by means of a thermistor probe. The homogeneous nature of the xylem of conifers lends itself to a mathematical prediction of these temperature changes in terms of the physical properties of the wood and the rate of sap flow and, conversely, the sap flow can be deduced from an analysis of the temperature changes. Experiments confirmed the theoretical predictions and showed that the instrument will be a very useful tool in sap-flow research [cf. *F.A.* 20 Nos. 1429–30].

2124. LEAPHART, C. D. **Root characteristics of Western White Pine and associated tree species in a stand affected with pole blight of White Pine.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 52, 1958. pp. 10. 8 refs.

On a one-acre plot in N. Idaho, *Pinus monticola* suffering from pole blight had a less ramified root system and a much lower density of fine roots than climax species on the same site, particularly *Thuja plicata*, which provided severe competition for moisture. The fine-root development of Pine appears to be favoured, and mortality reduced, where competition is restricted and available moisture high. Where the reverse occurs the capacity for rootlet regeneration appears to be low. [Cf. *F.A.* 18 No. 1935.]

2125. LEAPHART, C. D. **Pole blight—how it may influence Western White Pine management in light of current knowledge.** *J. For.* 56 (10), 1958 (746–51). 14 refs.

Reviews some of the literature, and classifies risk according to site and soil. The present ignorance of the cause or causes of the disease effectively prevents real management recommendations. The only alternative is to manage *Pinus monticola* on a risk classification built round soil factors influencing soil moisture. Continued research and observation are imperative.

2126. GRAHAM, D. P. **Results of pole blight damage surveys in the Western White Pine type.** *J. For.* 56 (9), 1958 (652–5). 4 refs.

The total b.a./acre of *Pinus monticola* affected plus that recently killed by blight, was determined from sample plots throughout the known range of the disease. The total b.a. in affected trees increased with the length of time the disease had been present, but damage was appreciable even in the most recently affected stands. In all diseased stands combined, ca. half the *P. monticola* b.a. was in blighted and recently blight-killed trees. No indication of the future course of the disease could be obtained from the surveys.

2127. LINZON, S. N. **Heartwood decay and needle blight of White Pine [*Pinus strobus*].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (4), 1958 (2).

Examination of the stems of 44 trees, half of them healthy and half affected by needle blight, revealed no relationship between heart rot in the merchantable parts of the stem and needle blight of White Pine in Ontario.

2128. TRYON, E. H., and TRUE, R. P. **Recent reductions in annual radial increments in dying Scarlet Oaks related to rainfall deficiencies.** *For. Sci.* 4 (3), 1958 (219–30). 17 refs.

[Cf. *F.A.* 18 Nos. 3155, 4372.] In this study in W. Virginia fungal pathogens were eliminated as a

cause. A table shows the number of U.S. Weather Bureau droughts (< 21 days with > 30% of the mean precipitation for the time and place) for the years 1949 (5), 1951 (3), 1953 (4) and 1955 (7). Best correlations of increment during the period were, for dying trees, with the precipitation of the previous July–August ($r=0{\cdot}964$) and, for healthy trees, with that of the previous July–September ($r=0{\cdot}782$). After each drought year, increment was reduced for both healthy and dying trees and the mortality of the latter increased. Drought, though perhaps not the sole cause, appears to be of primary importance in these losses.

2129. JOACHIM, H.-F. Über den Braunfleckengrind. [**The Poplar bark disease '*Braunfleckengrind*'.**] *Allg. Forstzeitschr.* 13 (38), 1958 (548–51). 10 refs. [G.g.]

Discusses symptoms, distribution, causes, susceptibility and control [cf. *F.A.* 19 No. 3105]. The disorder, most frequent in dense stands, is thought to be physiologically related to insufficient crown development. *Populus* × '*berolinensis*', *P.* × *robusta*, and *P. nigra* var. *italica* are listed as highly, *P.* × *serotina*, *P.* × *regenerata* and *P. trichocarpa* as slightly susceptible, and *P.* × *marilandica*, *P.* × *gelrica*, *P.* × 'grandis' and others as so far not affected.

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

51. Systems and Units of Measurement

2130. PIASECKI, B. **The Hoppus measurement of cubic content of timber**. *Bull. For. Dep. Ghana* No. 5, 1957. pp. vi + 17. 1 ref. Price 3*s*.

A detailed exposition covering advantages, equipment required, methods of measuring (including that of irregularly shaped logs), tallying etc.

52. Measurements of Stem Dimensions and Volume of Trees, Stands, Forests and Timber

521. Diameter (Girth) and Sectional Area

2131. WANNER, J. Die Gewichtskluppe. [**A caliper with 'weighted' [= multiples of b.a.] graduations.**] *Allg. Forstztg.* 69 (17/18), 1958 (230). 1 ref. [G.]

Describes such a caliper, now being made to the author's (inventor's) specifications, usually with a scale graduated in 10 $d^2\pi$ in addition to a cm. scale, and its advantages in determining b.a./ha., b.a. of mean stems, etc.

2132. MYERS, C. A. **Estimating past diameters of Ponderosa Pines in the Black Hills**. *Res. Note Rocky Mt. For. Range Exp. Sta.* No. 32, 1958. pp. 2. 1 ref.

Presents a table, based on 451 trees, from which past diameters o.b. at any given time can be calculated from (*a*) present diam. o.b., and (*b*) radial growth, all at d.b.h., during the relevant period (measured from increment cores). Values correspond closely to those obtained elsewhere [cf. *F.A.* 17 No. 4267].

2133. ALEMDAĞ, Ş., and SOYKAN, B. Aynali relaskop aleti ve alet ile yapılan çalısmalarda sıhhat derecesi. [**The mirror relascope, and its accuracy.**] *Orm. Araşt. Enst. tek. Bült.* No. 8, 1958. pp. 74. 24 refs. [Turk.e.*e*.]

Contains a full description of the instrument and how to use it, and data regarding its accuracy in a *Pinus sylvestris*/*P. nigra* stand, and a mixed Fir/Beech/Pine stand. The 11-page English summary contains many of the more important results of measurements on b.a., tree height, tree diam., form height, mean stand height and stand volume.

2134. BOZDĚCH, J., and PARKÁN, J. Ověření přesnosti a výkonnosti zrcadlového relaskopu. [**Examining the accuracy of, and rate of work with, the [Bitterlich] mirror relascope.**] *Práce výzkum. Úst. lesn. ČSR* No. 13, 1957 (293–304). 9 refs. [Cz.cz.russ.g.]

Measurements of b.a. at b.h., and timber volume/ha. were made in 100 pure, even-aged stands (mainly Pine and Spruce), covering 273 ha. Stand age varied from 80 to 125 years, and density from 0·8 to 0·9. The relascope gave a mean error of − 0·51% (max. − 7·7%) in measuring b.a., and − 2·9% (max. − 26·6%) in measuring volume, as compared with volume tables. It was found that a 2-man team could determine the cordwood volume of a 1-ha. pure, even-aged stand within 25 min., saving 90% of the time taken by calipering and the use of volume tables.

2135. CAROW, J. **Cruising pole timber by Bitterlich's angle-count method**. *Pap. Mich. Acad. Sci.* 43, 1957 (1958), (151–6). 4 refs. L.S.

In 1954, sampling was done at 35 points in stands of 6–14 in. diam. and varying density, in Pine, Spruce and Aspen types. At each point three sweeps were made with a Relascope and also d.b.h. measurements were taken on a conventional ⅕-acre circular plot. The coefficient of variation was least in stands of high b.a., and vice versa. Sweeps taken from the 97·4′ angle plot had a higher S.E. (7·2%) than those from the 69′ (6·77%) or the 49′ (6·5%) angle plot, and for an accuracy comparable to that of the ⅕-acre sampling unit, the 97·4′ angle would need 50% more points. Time needed to obtain data of similar accuracy was 5·1 min. for the 97·4′, 7·1 min. for the 69′, and 11·7 min. for the 49′ angle plot compared with 16·2 min. on a single fixed-radius plot.

2136. LEMMON, P. E. **Aids for using wedge prisms**. *J. For.* 56 (10), 1958 (767–8). 3 refs.

Presents two tables, one of which shows the cumulative values (to the nearest sq. ft. of b.a.) for different tree counts from one point and for prisms of round-number diopter strengths from 2 to 8. Reference to this table to convert a plot count to sq. ft. of b.a. reduces arithmetic errors in the field. The second table shows the width of targets needed to establish circular plots of different areas using prisms of different diopter strengths.

522. Height, Length

2137. MIHAJLOV, I. Eden nov brojčan metod za sostavuvanje na visočinski krivi na šumskite nasadi. **[A new numerical method for constructing height curves.]** *God. Zborn. zemj.-šum. Fak. Univ. Skopje* (*Šum.*) No. 8/9, 1956 (187–218). 18 refs. [Maced.maced.g.*g.*]

The author, with special reference to selection-type stands, criticizes free-hand curve construction methods as involving considerable subjective errors, and the method of least squares as being laborious and not always reliable, particularly for curvilinear functions. He favours an 'elementary' method of computing the parameters, and develops further a function originally proposed by him [cf. *F.A.* 6 p. 197] but now considered unsatisfactory as having only 2 parameters and not being linear with them. He first transforms this function into a 3-term approximation linear with its 3 parameters, yielding a graph that resembles the stand-height curve above breast-height. The use of this function is illustrated in three examples; the first is concerned with the 3-term approximation, and the pairs of height/diameter co-ordinates are separated into 3 approximately equal diameter-class groupings, the means for each group being calculated. With these means it is possible to set up 3 equations with 3 unknown parameters; by the normal process of elimination, the 3 parameters are determined, and hence the height regression corresponding to the 3-term function. For better and more flexible regressions, 4 and 5 parameters are required, but as calculation of the parameters by elimination would be laborious, the author proposes and illustrates a method of taking 3 parameters at a time, as above, obtaining 2 regressions which are combined for 4 parameters, and 3 regressions likewise for 5 parameters. In all examples the standard deviations compared favourably with those obtained by the method of least squares.

523. Bark

2138. KLEPAC, D. Funkcionalni odnos između debljine kore i prsnog promjera za naše važnije listopadno drveće. **[The relationship between bark thickness and d.b.h. for the more important Jugoslavian hardwoods.]** *Šum. List* 82 (7/9), 1958 (251–67). 15 refs. [Croat.croat.e.*e.*]

From measurements of 26,956 stems, applying statistical methods, double bark thickness at b.h. is shown by 5-cm. diam. classes for 15 hardwood species. Formulae are also given showing the relationship of diam. u.b. to diam. o.b., and expressing bark volume as a % of stem volume for these species.

2139. ALVES, A. A. MONTEIRO. Tabelas de previsão de peso de cortiça para o sobreiro nos xistos do carbónico. **[Tables for forecasting weight of cork from Cork Oak on Carboniferous schist soils.]** *Bol. Junta nac. Cortiça, Lisboa* No. 237, 1958 (233–43, lvi, 52). 6 refs. [Port.e.f.]

On the basis of analyses of Cork stands in the Carboniferous schist regions of S.E. Portugal, a formula is drawn up for forecasting the exploitable weight of cork from a stand, taking account of 3 variables—mean d.h.b., height of stripping, and cork thickness.

524. Determination of the Volume of Trees and Stands

524.1. Principles of Volume Determination. Form (Taper)

2140. MINCKLER, L. S., and GREEN, A. W. **Upland hardwoods form classes.** *Sta. Note Cent. St. For. Exp. Sta.* No. 118, 1958. pp. 2. 1 ref.

Form classes in S. Illinois are shown by species, diam. class and location for Hickory, *Quercus alba*, *Q. velutina*, *Q. rubra*, *Q. coccinea*, *Q. falcata*, *Q. stellata* and *Liriodendron tulipifera*.

524.3. Volume of Tree Groups and Stands

See also Nos. 1495, 1630, 2190–2.

2141. KRAÜTER, G. Das Waldhöhentarifsystem. **[The 'forest height tariff'.]** *Wiss. Abh. dtsch. Akad. LandwWiss., Berl.* No. 29, 1958. pp. 149 + 12 gphs. 63 refs. [G.g.russ.e.]

A full version of a paper previously published in summarized form [cf. *F.A.* 17 No. 3099]; it includes the tables and graphs forming the tariff and additional sample computations etc.

2142. CANTIANI, M. Tavola cormometrica dell' abete bianco e dell' abete rosso di Paularo cresciuti in fustaia da dirado. **[Volume table for *Abies alba* and *Picea abies* of Paularo (Udine) grown in selection forest.]** *Ital. for. mont.* 13 (4), 1958 (145–9). [It.it.f.]

The single-entry table was based on sectional measurements of 822 felled trees. To permit its application to other forests, a correlation was established between d.b.h. and total height. Correlations were also established for age/volume, age/d.b.h., and age/total height.

2143. GŁĄBIŃSKI, J. Dalsze badania dokładności tablic miąższości Grundnera-Schwappacha dla drzewostanów sosnowych Lasów Rogowskich. **[Further investigations on the accuracy of the Grundner-Schwappach volume tables for Scots Pine stands in Rogów forest.]** *Sylwan* 102 (3), 1958 (41–60). 3 refs. [Pol.russ.g.]

A continuation of Grochowski's work [see *F.A.* 15 No. 3867]. The accuracy of the G-S tables for Pine timber in pure stands (*a*) of mean age 95 years (205 trees investigated), and (*b*) 89 years (254 trees) was tested separately for material $<$ and $>$ 80 years, and the results compared with those of Grochowski. In all cases the tables gave too great volumes; the errors are analysed and results confirm the earlier findings.

2144. MARIN, E. T. **Alinement chart volume table for White Lauan (*Pentacme contorta* (Vid.) Merr. and Rolfe) in Tagkawayan forest, Quezon Province.** *Philipp. J. For.* 11 (1/2), 1955 (1956), (101–33 + 1 gph., 1 chart). 7 refs.

2145. ORDEN, T. **Preparation of local volume table for Large-leaf Mahogany (*Swietenia macrophylla* King) and its application.** *Philipp. J. For.* 12 (3/4), 1956 (1958), (117–32). 8 refs.

Based on 250 standing trees, between 18 and 38 years old, in the Bureau of Forestry plantation, Makiling National Park, College, Laguna.

2146. RECTO, C. **A method of constructing form factor volume tables.** *Philipp. J. For.* 11 (1/2), 1955 (1956), (29–56). 6 refs.

Proposes a simple procedure for preparing volume tables for species on which no taper studies have yet been made, basing the construction on diameter, log length and form factor.

2147. KINASHI, K., and SCHUMACHER, F. X. **A test of the standard volume table by multiple regression.** *Repr.* from *Bulletin of the Kyushu University Forests* No. 30, 1958 (127–33). [E.jap.]

Presents the results of calculations applied to the standard volume table for hardwoods of Kyushu, based on systematic sampling (28 trees of 13 species). A revised diam./ht. volume table is presented.

2148. KALLIO, K. Havaintoja kyvystä arvioida silmävaraisesti puuston kuutiomäärä ja rakenne. **[Observations of ability to estimate the volume and structure of a growing stand by eye.]** *Metsät. Aikak.* 1958 (2), (42–6). 7 refs. [Fi.e.]

Compares the results of ocular estimates of total stand and sawlog, pulpwood and fuelwood volume by 4 men on 10–25 plots each of an area of forest, against estimates by line-plot sampling of the same plots and, from these, of stumpage values per cu.m. and per ha. Three of the men over-estimated the small volumes and underestimated the large, but as the opposite was true of their estimates of assortments, the differences between estimated and actual stumpage values tended to even out.

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

See also Nos. 2133–6, 2195.

2149. NÄSLUND, M. Die schwedische Reichswaldtaxation. **[The Swedish State Forest Survey.]** *Forstwiss. Cbl.* 76 (11/12), 1957 (321–33). [G.]

Discusses the system in operation, whereby annual estimates of standing volume, increment and felling (all expressed in cu.m.) are obtained.

2150. Brasil inicia la explotación forestal de las vecinas selvas amazónicas. **[Brazil initiates the exploitation of the nearer forests of Amazonas.]** *Agric. venez.* 21 (198), 1958 (7–9). [Span.] A.P.B.

Short notes on the work, begun in 1952 and still in progress, by the FAO mission to the forests of Amazonas. A detailed inventory has been made of a strip 80 km. in length along the south bank of the Amazon, between the rivers Tapajoz and Xingu and, with this information as a basis, an aerial survey of further areas is in progress. A training centre for workers in forest industries has also been set up near Santarem.

2151. FRASER, H. **The enumeration of the growing stock in tropical forests.** *Emp. For. Rev.* 37 (3), 1958 (316–9).

The problem of determining the distribution of species and assessing the volume of standing timber in mixed, uneven-aged tropical forests is discussed. The methods of survey and of recording field data are described. A system for the computation of volumes and the analysis of volume figures by area and species is given and a method of compiling a stock map on which the area can be divided into coupes giving an equal annual yield is described. *Author's summary.*

2152. COUSENS, J. E. **A study of 155 acres of tropical rain forest by complete enumeration of all large trees.** *Malay. Forester* 21 (3), 1958 (155–64 + 1 map). 7 refs.

A complete enumeration of 155 acres of virgin forest for all species > 4 ft. g.b.h. or above buttresses is described. While floristically the area shows considerable variation, there is little large-scale variation in structure. Symington's coastal-hill-forest association appears to be clearly defined. It is demonstrated that systematic sampling at 10% intensity gave a maximum error of 12·5%. Unrestricted random and stratified random samples at 20% intensity showed somewhat higher maximum errors than systematic sampling. One-chain-wide strips were preferable to any wider strips or compact blocks. Recommendations are made for sampling areas of normal compartment size for all species and for commercial species only; they include the adoption of stratified random sampling and measures to ensure an adequate number of strips. *Author's summary.*

2153. REYNDERS, M. Note sur la méthode d'estimation appliquée dans la forêt de montagne du Ruanda. **[The sampling method used in Ruanda montane forest.]** *Bull. agric. Congo belge* 49 (4), 1958 (1039–43). 2 refs. [F.du.]

Describes method, instruments and records used in the stratified random sampling (10%) of 40 ha. and gives for the 4 ha. the exploitable volumes (144 trees, 516·2 cu.m.) and % contributions to these by species, viz. *Newtonia* [*Piptadenia*] *buchananii* 26%, *Parinari* sp. 23, *Strombosia schleffleri* 10, *Syzygium* sp. 9, *Carapa grandifolia* 7, 'Ingomwa' 6, *Cassipourea* sp. 4, and the rest by 5 others.

525. Volume by Assortments. Merchantable Volume

See also Nos. 1998, 2197.

2154. STOTT, K. G. **Cricket Bat Willows: sale and utilization of the Long Ashton trees.** *Rep. agric. hort. Res. Sta. Univ. Bristol 1957*, 1958 (143–55 + 11 photos). 10 refs.

Gives details of sale, grading, assortments produced, and costs and methods of conversion, for 55 trees of *Salix alba* var. *caerulea* planted 1928–34 and harvested 1956–57.

2155. FROELICH, R. C. **Timber cull in Virginia and the Carolinas.** *Res. Note Stheast. For. Exp. Sta.* No. 121, 1958. pp. 2.

Analyses the causes of loss in merchantable sawtimber by species-groups and types of defect, on the basis of studies involving > 3000 trees on 300 plots. 'Roughness' (i.e. sweep and crook, forks and large limbs) accounted for most of the rejections. Rot was important in hardwoods.

526. Log Measurement. Scaling

2156. VILLIÈRE, A. **The physical properties of wood and their effect on the sale of pulpwood and chemical pulp manufacture.** British Paper and Board Industry Research Association, Kenley, Surrey. 1958. pp. 14. Transl. by E. A. M. Thomson from *Bulletin, Association Technique de l'Industrie Papetière, Paris* 1956 (3), (67–77). Limited distribution.

Discusses the disadvantages of the stere and proposes instead the use of dry weight as the unit in pulpwood purchase.

2157. NYLINDER, P. Orienterande studier över viktvariationen hos helbarkad granmassaved. **[Variations in weight of barked Spruce pulpwood.]** *Uppsats. Instn. Virkeslära K. Skogshögsk., Stockh.* No. 15, 1958. pp. 23 + 14 photos, 24 tbls. 6 refs. [Sw.sw.e.]

Describes investigations into (*a*) moisture content, as varying within and between logs of the same and different stacks, (*b*) oven-dry density, and (*c*) weight per stacked measure, discussing sampling methods, required sampling intensities etc. In disks cut ca. 10 cm. from the end of logs, (*a*) corresponded well to mean m.c. of the log. Increment borings gave too low values. Within stacks, (*a*) varied comparatively little, but (*b*) (the chief criterion of quality) varied considerably, and (*c*) by 20–21% round the mean for each district. The comparative merits of scaling and weighing are discussed.

527. Solid Volume of Stacked Products (including Converting Factors)

See also Nos. 2156–7, 2448–9.

2158. **Photographic check scaling.** *Timber of Canada* 19 (9), 1958 (21).

The Canadian International Paper Co., which buys much pulpwood from farm woodlots, has established a solid cu. ft./cord figure of 85 for softwoods and 82 for hardwoods. A method has been devised for checking the solid content of wood purchased on this basis. Colour photographs are taken of bolt ends of partial tiers on randomly selected lorries; the negatives are developed and are then projected on to a screen on which are superimposed 600 dots equally spaced at ½-in. intervals. The dots falling on wood are counted, and solid cu. ft./cord determined from the formula

$$\frac{Gd - DW}{GD - DW - DV} \times 128,$$

where G = scaler's gross cords for the load, d = dots falling on wood, D = total dots on screen, V = void deductions (in cords), W = total of scaler's cull defect and undersize deductions (in cords). On the basis of current variation in cu. ft./cord, it has been found that 300 photographs are required for hardwoods and 120 for softwoods, over a convenient time, to give an average with ± 1% accuracy. Two photographs are chosen at random for each scaler daily and the results are plotted on a quality-control chart for solid content. Limits have been plotted on the chart, and when a scaler's results fall outside these limits, corrective action is immediately taken by the chief scaler.

2159. WOODFIN, R. O., and LANDT, E. F. **Conversion of cubic-foot volumes of Black Hills Ponderosa Pine to cords.** *Res. Note Rocky Mt. For. Range Exp. Sta.* No. 31, 1958. pp. 2. 3 refs.

Conversion factors are shown for trees of two age groups: 51–100 years, and > 101 years, both by total tree height and to a 4-in. top diam. u.b.

53. Special Measurements of Trees and Stands (Crown Dimensions, Stand Density etc.)

2160. LYNCH, D. W. **Effects of stocking on site measurement and yield of second-growth Ponderosa Pine in the Inland Empire.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 56, 1958. pp. 36. 28 refs.

Data for this study were collected from 207 plots of even-aged second-growth in the Pacific Northwest, covering a wide range of sites, stand densities and ages from 25 to 125 years. Stocking was evaluated from an equation based on b.a., age and height, giving a stocking % for each plot, with 100% representing the mean for all plots. Adjusted site-index curves, based on 24 pairs of plots identical except in stocking, are presented for 100, 110 and 120% stocking, suitable for the conditions of the Inland Empire. As an aid to forecasting yields, graphs are given showing b.a. by age (and the relationship of present and future numbers of trees) for different initial b.a. at 30 years and for various site indices, and a yield table (40–120 years) for average stocked stands. Details of analytical methods are described in an appendix.

54. Assessment of Site Quality

See also Nos. 1377, 1545, 2160, 2195.

2161. HOFFMANN, D. Die Ermittlung der dynamischen Bonität der Fichte auf Grund der Standorterkundung. **['Dynamic' site classification for Spruce on the basis of site surveys.]** *Allg. Forstzeitschr.* 13 (46), 1958 (676–9). 7 refs. [G.g.]

Describes the methods used at Koblenz to obtain height curves for a 'dynamic' site classification, i.e. one based on the height of a stand, comparable in establishment and treatment as well as site factors at, say, age 100, and not merely on existing height ('static' classification), so as to avoid, in a given stand, changes in site class where growth patterns differ from those of yield tables. Not only site factors but factors of establishment (sowing or planting etc.) and exact age determination are of great importance.

2162. SEMB, G., and RAGNARSSON, H. Sammenhengen mellom markens produksjonsevne og enkelte egenskaper ved jordsmonnet. **[Relationship between the productive capacity of the soil and some soil properties.]** *Tidsskr. Skogbr.* 66 (3), 1958 (123–9). [Nor.]

The properties studied were texture, drainage and gradient. Annual increment for Spruce in a forest N.W. of Sarpsborg was higher on fine than on coarse sand, and increased with increasing moisture retention in the soil and also with increasing gradient. It is emphasized that the material is limited and that the results are not necessarily valid for other areas.

2163. COPELAND, O. L., JR. **Soil-site index studies of Western White Pine in the Northern Rocky Mountain Region.** *Proc. Soil Sci. Soc. Amer.* 22 (3), 1958 (268–9). 6 refs. O.R.E.

[Cf. *F.A.* 18 No. 1969.] From soil investigations and height and age measurements on 37 *Pinus monticola* stands of various ages, the site index at 50 years was determined by using White Pine site curves. Site index was correlated significantly with effective soil depth, depth to the zone of reduced permeability, and the available water-holding capacity of the top 3 ft. of soil.

2164. HOLSTENER-JØRGENSEN, H. Jordbundsfysiske undersøgelser i danske bøgebevoksninger. **[Physical soil studies in Danish Beech stands.]** *Forstl. Forsøgsv. Danm.* 25 (2), 1958 (93–223). 62 refs. [Dan.dan.e.*e.*]

The study was made on the Forsøgsvæsen's permanent sample plots representing the Danish moraine area, for which increment records are available over a long period. Factors studied on each were water content, volume weight, pore density, mechanical composition, pH, and accessible K and P, results being shown in graphs and tables. For each plot the mean rainfall in the growth period was obtained from records, to cover the years for which increment records were studied. The height-increment figures of the plots are above those in Danish yield tables. A correlation was found of available-water capacity (w.c.—the difference between the water content of the soil at $\frac{1}{10}$atm. suction and 15 atm. excess pressure) with texture, and to some extent with available K and P. The results of cation-exchange studies suggest that determination of K should be carried out at depths of 20–60 cm., not of 0–20 cm.; K consumption appeared to be highest at 30 cm. A fairly clear correlation was found between w.c. at different soil depths. Investigation of sites where the top-soil is affected by wind shows a considerable decrease in available w.c. A study of vertical distribution showed the majority of fine roots occurring in the upper 40 cm. of the soil. In the study of increment in relation to available w.c., corrections were made for the effect of age. It was found that an increase of 40 mm. in w.c. was needed to raise site class by 1 degree (i.e. a height increase of 4 m. at 100 years). Within an age group, a good correlation was found between volume increment and w.c.; the effect of w.c. was greatest in old stands (mean age 148 years). Correlations between increment and w.c. at different soil depths, by 10-cm. steps, were closer at depths between 0 and 40 cm. than between 40 and 70 cm. High water-table appeared to have no effect on increment. One sample plot on a fairly steep west-facing slope, studied separately, showed a distinct lateral movement of water; annual volume increment was 30% above that expected from the w.c., and this is attributed to the greater amounts of water available to the trees as a result of the lateral movement. The value of the results is discussed.

2165. MØLLER, C. M. Bøgeboniteterne på Boller. **[Beech quality class at Boller.]** *Dansk Skovforen. Tidsskr.* 43 (8), 1958 (409–17). [Dan.]

Comments on a previous article [cf. *F.A.* 20 No. 867] and suggests that the improvement described there is due to the change to even-aged plantations rather than to any real improvement in site quality.

2166. OKSBJERG, E. B.; MØLLER, C. M. **[Beech quality class.]** *Dansk Skovforen. Tidsskr.* 43 (9), 1958 (463–71). [Dan.]

Further discussion arising from an article by Sabroe [see *F.A.* 20 No. 867].

56. Increment. Development and Structure of Stands

See also Nos. 1522–4, 1545, 1585, 1596, 1631, 1648–9, 1660, 1669 *et seq.*, 1798–1802, 1804–5, 1810 *et seq.*, 1834, 2197, 2203.

2167. KRAMER, H. Forstwirtschaftliche Betrachtung von Wegebreite und Randwirkung. **[Road width and edge effect.]** *Forstwiss. Cbl.* 77 (9/10), 1958 (295–310). 27 refs. [G.g.]

[Cf. *F.A.* 20 No. 869.] Includes a discussion of the differences in road density, and hence stand vol./ha., between flat and mountainous country. For Spruce, roads reduce this, on average, by 3·4 cu.m./ha. (mountains), and 5·6 cu.m. (flat); for Beech by 0·1 and 0·4 respectively. The ability of branches to extend over the road was also determined. Results indicate that Spruce should be planted ca. 4·5 m. from the edge of the road to prevent overhang; with Beech it is not feasible to try to keep the roadway clear of overhanging branches. When planting near estate boundaries, it is recommended that Spruce be planted $\not<$ 3 m. from the boundary line, and Oak and Beech $\not<$ 6 m.

2168. ZAHAROV, V. K. Sravnitel'naja produktivnost' sosnovyh i elovyh nasaždenij pri odinakovyh lesorastitel'nyh uslovija. **[Comparative yield of [unthinned] Scots Pine and Spruce stands under identical conditions.]** *Lesn. Hoz.* 11 (2), 1958 (8–10). [Russ.]

Pure unthinned Scots Pine and Spruce stands, both planted at 5000 trees/ha. on identical sod-podzolic soils, were measured at 55 years. Mean diam. and ht. were 23·9 cm. and 24·3 m. for the Pine, and 20·6 cm. and 24·7 m. for the Spruce. The volume per ha. was 372 cu.m. for Pine (713 stems) and 539 for Spruce (1385 stems), and c.a.i. 9·8 and 13·8 cu.m./ha. respectively. The assortment structure of the stand was determined, 89·1% of the Pine being utilizable and 86·3% of the Spruce. The Spruce was adjudged superior to the Pine both quantitatively and qualitatively.

2169. WOHLFAHRTH, E. Vom Wachstum der Kiefer auf Stagnogleyböden des Buntsandsteins. **[The growth of Pine on 'stagnogley' soils of the bunter sandstone region.]** *Allg. Forstzeitschr.* 13 (33), 1958 (460–2). 3 refs. [G.]

The Pine, like the Spruce from this site [cf. *F.A.* 19 No. 4637], showed many cases of narrow rings ($<$ 0·5 mm.) for up to 90 years, followed by rings 2–3 times that width. Some of the latter (but not all) could be the effect of a drainage scheme. Individual differences between the 300 stems examined largely obscured any patterns due to meteorological fluctuations.

2170. WORTHINGTON, N. P. **How much Douglas-Fir will grow on an acre?** *J. For.* 56 (10), 1958 (763–4). 1 ref.

Describes a site in Washington, and gives data on height, b.a., number of stems, and increment of its 375-year Douglas Fir stand with a 150-year Western Hemlock understorey. The total standing volume on one selected acre of the stand is 390,190 board feet (52,780 cu. ft.), of which the Douglas forms 371,820 bd. ft.

2171. MAYER, R. Kronengrösse und Zuwachsleistung der Traubeneiche auf süddeutschen Standorten. **[Crown size and increment of Sessile Oak on South German sites.]** *Allg. Forst- u. Jagdztg.* 129 (6; 7; 8/9), 1958 (105–14; 151–63; 191–201). 70 refs. [G.g.e.]

Analyses development of growth, structure and yield, chiefly on the basis of permanent sample plots in the Pfälzer Wald, the Spessart, and the Steigerwald, with special attention to the influence of position in canopy and the size and shape of crowns. Development of height and density varied considerably and differed from yield-table figures, with yields up to 120 years below yield-table values. Ring widths had an upper limit of ca. 2·5 mm. and were little influenced by thinning. The relationships of crown class, dominance, age, and site to increment per sq. m. of crown projection described in *F.A.* 19 No. 2144, are discussed in greater detail. Epicormics were more frequent in the lower tree classes, but bore no relation to area of crown projection within each class. Both mean width of annual rings and fluctuations of ring width with the weather, were greater for broad-crowned trees. Correlations were found between ring widths and mean temperatures of the 2 previous years and the precipitation of the current year. The implications of the chief findings (pointing towards the desirability of greater stand densities) are discussed with reference to differences of value in sizes etc.

2172. GUIMARAES, R. FOOT, and GOMES, F. PIMENTEL. Comportamiento de especies de *Eucalyptus* en suelo arenoso pobre. **[Behaviour of Eucalypts on poor, sandy soil.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 252–200, 1957. pp. 21 + 5 tbls. [Span.]

Two sets of experiments were undertaken at the Aimorés Forest Nursery, São Paulo, Brazil, by the Companhia Paulista de Estradas de Ferro, to estimate production of (1) fuelwood and (2) sawtimber by different Eucalypt species on poor soils. In (1) the rating of *Eucalyptus alba* was excellent, and that of *E. grandis*, *E. saligna*, *E. saligna* var. and *E. robusta* very good. If, in addition to fuelwood, small timber for posts, sleepers etc. is to be produced, the following are recommended: *E. alba*, *E. grandis*, *E. saligna* var., *E. paulistana*, *E. rostrata*, *E. punctata* and *E. resinifera*. In (2) no definite conclusions could be drawn, but the following species showed the most promise: *E. alba*, *E. grandis* (excellent), *E. saligna*, *E. punctata*, *E. resinifera* (very good) and *E. citriodora*, *E. robusta*, *E. saligna* var., *E. kirtoniana* and *E. botryoides* (good).

2173. SAMPAIO, A. NAVARRO. Explotaciones forestales en ciclos largos—el eucalipto como productor de maderas para aserraderos. **[Long-term rotation in forest exploitation—Eucalypts as producers of sawtimber.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 230–200, 1957. pp. 4. [Span.]

Presents the figures for intermediate and final yields from a plantation of *Eucalyptus tereticornis* in São Paulo, Brazil, managed on a 39-year rotation.

2174. TAGUDAR, E. T. **Hagakhak (*Dipterocarpus warburgii*) and Palosapis (*Anisoptera thurifera*) stands in the plantation—an abstract.** *Philipp. J. For.* 12 (1/2), 1956 (1957), (91).

Compares increment data for 16- and 17-year-old plantations of *A. thurifera* and *D. warburgii* respectively, to the advantage of the latter.

2175. ARDIETA, R. R. **Determination of yield of cut-over forest areas on Mount Makiling at known periods after clearing.** *Philipp. J. For.* 12 (3/4), 1956 (1958), (133–49 + 3 dgms.). 8 refs.

A study was made of natural regeneration of *Endospermum peltatum* and *Trema orientalis* on abandoned *kaiñgins* (temporary cultivation). Comparative figures of m.a.i. (height, diam., and volume) and yield are given for 7-year-old regeneration of both species.

561. Increment in Height, Diameter, Basal Area, Form and Quality. Variations and Trends; Dendrochronology

See also Nos. 1914, 2128, 2132, 2184.

2176. POZDNJAKOV, L. K. Daurskij možževel'nik v južnoj Jakutii. **[*Juniperus dahurica* in S. Yakutsk.]** *Bot. Ž.* 43 (6), 1958 (860–1). 2 refs. [Russ.]

Compares the height growth of *J. dahurica* and *J. sibirica* in the Lena and Olekma valleys. *J. dahurica* grows the faster, and may be useful for soil fixation on steep slopes.

2177. SIOSTRZONEK, E. Radialzuwachs und Flächenzuwachs. **[Radial increment and basal area increment.]** *Forstwiss. Cbl.* 77 (7/8), 1958 (237–54). [G.g.]

As part of investigations into the effect of fellings on the increment of trees at the margins of stands, the causes of error in calculating b.a. increment were examined, and, on the basis of systematic mathematical and practical investigations on disks of Spruce, 5 general shapes were determined, through which the b.h. cross-section of a tree generally passes (circle, excentric circle, oval, parabola-circle, and irregular). Boring in the direction of the pith at ca. 70° to left and/or right of the maximum radius was found to give cores allowing a fairly accurate calculation of increment, and the position of this point apparently does not vary with age or site, but does vary with species. The accuracy of other methods of boring is also discussed.

2178. MCCLURKIN, D. C. **Soil moisture content and Shortleaf Pine radial growth in Northern Mississippi.** *For. Sci.* 4 (3), 1958 (232–8). 8 refs.

[Cf. *F.A.* 14 No. 1430.] Daily radial increments derived from dial-gauge dendrometer readings on 16 dominants in each of 3 blocks of 19-year *Pinus*

echinata (b.a./acre 83–148 sq. ft. with hardwood understorey b.a./acre 10–31 sq. ft.) were correlated in multiple regression analyses with soil moisture (in 1-ft. levels to 4 ft.), soil temperature, rainfall etc. Of the 10 independent variables examined, the strongest correlations were with elapsed days of the growing season ($r = -0{\cdot}380$, $-0{\cdot}420$ and $-0{\cdot}380$, significant at 1%) and with available moisture in the entire 4-ft. profile ($r = 0{\cdot}283$, significant at 5%, and 0·298 and 0·392, significant at 1%). There remained considerable unexplained variations in daily growth rates. Growth dropped sharply with rapid soil moisture depletion.

2179. HOMBERT, J. Étude de l'accroissement d'essences forestières en milieu naturel au Mayumbe. **[The increment of species in the Mayumbe forests.]** *Bull. agric. Congo belge* 49 (4), 1958 (1017–29). [F.du.]

Includes a table showing, for initial girth classes of 30, 50 . . . 190, > 200 cm., measured at 1·5 m., the 5 or 7 years' girth increment of > 92 species (16,000 stems measured) from mesophilous semi-deciduous forest now being treated by *uniformisation par le haut* [cf. *F.A.* 13 No. 2002]. For each species, under each girth class, is given (*a*) the m.a.i.; (*b*) the number of stems measured for (*a*); (*c*) the maximum m.a.i. found; and (*d*) the mean m.a.i. of all girth classes. The species are grouped for (*d*) into < 1, 1–1·9, 2–2·9, and > 3 cm. under subdivisions according to (*c*). The majority of the light-demanders typical of the top storey (18 species) had the fastest growth rates with (*d*) > 2 cm. or with (*d*) 1–1·9 cm. and (*c*) > 2 cm., *Musanga smithii* and *Ricinodendron heudelotii* heading the list. *Chlorophora excelsa* and 11 other light-demanders (generally of the dominated storeys of old modified or secondary forest) were slower. A high % of the large dominants and co-dominants of the old modified forests (chiefly tolerant or far less exacting species) fell into the 1·0–1·9-cm. group (30 species). A group of 7 large tolerant or shade-bearing species had (*d*) < 1 cm. but (*c*) sometimes > 1 cm. The majority of shrubby and dominated species (38) had increments ranging through very small, small, to medium. The data are not definitive, and maximum values for (*c*) for some species were three times the mean, a range probably attributable to variations in site, past history, age and treatment. The low increment of *Terminalia superba*—(*d*) 1·7 and (*c*) rarely up to or > 2 cm.—as compared with its plantation growth, is another example.

2180. NICHOLSON, D. I. **One year's growth of *Shorea smithiana* in North Borneo.** *Malay. Forester* 21 (3), 1958 (193–6).

After a method outlined by H. C. Dawkins [cf. *F.A.* 18 No. 1986], the growth in girth of 5 trees of *S. smithiana* was followed over a period of one year, taking fortnightly measurements. The author finds the method adequate, but time-consuming and expensive, and sees little chance of its superseding more usual methods of accurate girth determination in N. Borneo. A positive relation between crown size, position, and growth is noted for trees of comparable size. Two short pauses in growth are observed and their relation to rainfall and flushes of new leaves discussed. *From author's summary.*

562. Volume Increment

See also No. 2200.

2181. CONN, H. **Stem analysis of trees at Baronscourt.** *Forester, N. Ire.* 1 (4), 1958 (25–30).

The growth of Douglas Fir in relation to other species growing at Baronscourt appears to be very slow, so a stem analysis of a 35-year tree (*a*) was undertaken and analyses made at the same time of comparable stems of Sitka Spruce (*b*), Japanese Larch (*c*), and *Abies grandis* (*d*), all growing in pure stands in adjoining compartments. The results are shown on graphs. On the height/age curve, the most rapid growth of (*a*) occurred at 10–15 years and then slowed up; (*b*) made rapid growth up to 19 years and then slowed up, (*c*) and (*d*) overtaking it in height growth after that age. Volume at 32 years was: (*a*) < 10 cu. ft., (*b*) > 27 cu. ft., (*c*) > 15 cu. ft., and (*d*) > 21 cu. ft. Though slow, the volume increment of (*a*) is regular and shows no sign of falling off; it actually increases between 30 and 35 years of age.

2182. BJARNASON, H., and RAGNARSSON, H. Viðurvöxtur barrtrjáa á Íslandi. **[Growth of conifers in Iceland.]** *Ársr. Skógræktarf. Íslands* 1958 (110–4). [Ice.]

A graph is presented showing the volumes/ha. for Larch, Norway and Engelmann Spruce, and Pine, from 0 to 80 years, derived from measurements on stands in Iceland, and from Russian and Scandinavian data. Volumes at 80 years are estimated at 460, 435 and 245 cu.m./ha. for Larch, Spruce and Pine respectively and m.a.i.'s at 5·75, 5·44 and 3·06 cu.m.

2183. WILLISTON, H. L. **Shortleaf versus Loblolly Pine in North Mississippi.** *J. For.* 56 (10), 1958 (761). 1 ref.

Analyses records showing that 23-year *Pinus taeda* plantations have, despite poorer survival, produced 13 cords/acre more than *P. echinata* of the same age on adjacent sites. Despite *P. taeda*'s better volume production, *P. echinata* has done well, and is a good species to plant in areas where sleet storms are prevalent and early tip-moth (*Rhyacionia frustrana*) damage is not a problem.

2184. CHATELAIN, F. Temps de passage et accroissements. **[Recruitment period and increment.]** *Rev. for. franç.* 10 (11), 1958 (691–703). 9 refs. [F.]

The author proposes certain refinements for improving Loetsch's method of calculating volume increment from increment cores, as explained by J. Pardé [see *F.A.* 20 No. 880]. These include (1) the substitution of annual radial increment (the factor actually measured on the increment core) for annual diameter increment, in the basic formula; (2) taking into account the recruitment period, which is related to annual radial increment in the ratio $S \times a' = 2{\cdot}5$, where S = recruitment period for an increment of 5 cm., and a' = annual radial increment in cm. It is demonstrated that the use of mean values of recruitment period may give errors of as much as

10%, whereas the median value (which should always be used) gives errors of only 2–3%. An example of volume estimation using these methods is worked out, and the effect on the amount of sampling necessary is discussed.

566. Yield Tables and Their Construction

See Nos. 1630, 2160.

2185. VOLKMANN, J. H. Welche Holzerträge sind aus der Steigerung des Pappelanbaus in Westdeutschland zu erwarten. **[How much wood may be expected from the increased Poplar growing in W. Germany?]** *Allg. Forstzeitschr.* 13 (38), 1958 (533–6). 12 refs. [G.]

Assuming a total final area of 500,000 ha. resulting from plantings of 10,000 ha./year starting from 1948, and a 50-year rotation, sustained yield at ca. 2000 A.D. is estimated at 5,000,000 cu.m. o.b. at best. A tentative yield table for *robusta*-type Poplars is presented, based on published figures by Rätzel [cf. *F.A.* 18 No. 4392] and Blüme [cf. *F.A.* 13 No. 118] and on the author's own observations (for which no details are given).

58. Surveying and Mapping. Aerial Surveys

2186. DUCHAUFOUR, P., *et al.* Un exemple d'utilisation pratique de la cartographie des stations: la forêt du Ban d'Étival. **[An example of the practical use of site mapping: the forest of Ban d'Étival.]** *Rev. for. franç.* 10 (10), 1958 (597–630 + map). 20 refs. [F.]

A detailed study made (under supervision) by a group of students from Nancy. The final map shows both humus types (mull, moder, and mor) and forest types (hygrophilous 1 and 2, mesophilous, xerophilous and very xerophilous).

2187. NASH, A. J. **Template for assisting photo interpretation.** *J. For.* 56 (8), 1958 (594).

Illustrates the template, and explains its use.

2188. MOESSNER, K. E., and ROGERS, E. J. **Parallax wedge procedures in forest surveys.** *Misc. Publ. Intermt. For. Range Exp. Sta.* No. 15, 1957. pp. 22 + 1 gph., 1 tbl. 8 refs.

Explains principles and practical applications.

2189. HAGBERG, N. Hjälpmedel för utnyttjande av skogsbilder som skogskartor. **[Equipment for using aerial photographs as forest maps.]** *Svenska SkogsvFören. Tidskr.* 56 (3), 1958 (293–306). 25 refs. [Sw.e.*e.*]

Describes and discusses the (American) orthophotoscope for obtaining near-orthographic projections, improved stereo-mosaics, mapping aids (multiscope, antiscope etc.) and distance meters, including the geodimeter (based on high-frequency light signalling) and the tellurometer [cf. *F.A.* 20 No. 887].

2190. AVERY, G. **Composite aerial volume table for Southern Pines and hardwoods.** *J. For.* 56 (10), 1958 (741–5). 2 refs.

Mixtures of Loblolly and Shortleaf Pines and hardwoods cannot be effectively separated on 1 : 20,000 panchromatic photographs for evaluating stand vol./acre. It is, however, possible to construct aerial stand-volume tables applicable to these mixtures. Such tables may be compiled from individual tree measurements, provided that acceptable relationships can be established between stem and crown diameters, and should yield estimates of mean vol./acre within 10% of actual field vol. if the photographic measurements of total height, crown diam., and canopy closure can be reliably determined.

2191. NAKAYAMA, H. **A study on forest survey from aerial photographs.** *Bulletin of the Nagoya University Forests* No. 1, 1958. pp. 63. 55 refs. [E.e.jap.]

Trials were made in 79 randomly selected sample plots in pure Sugi [*Cryptomeria japonica*] forests in the northern part of Aichi prefecture. Mean stand height of the individual sample plots ranged from 5·8 to 30·8 m.; the systematic error (x) was $-$ 1·8 $\pm$ 0·2 m. at the 5% probability level, and the standard deviation (S.D.) $\pm$ 2·8 m. Mean crown diameters for individual plots ranged from 1·7 to 4·8 m.; x was $-$ 0·01 $\pm$ 0·06 m., and the SD $\pm$ 0·5 m. The number of trees ranged from 228 to 1673/ha., x being $-$ 15 $\pm$ 8 and the SD $\pm$ 75. Stand volume derived from stand height alone ranged from 11 to 885 cu.m./ha., x being $-$ 34 $\pm$ 34 cu.m./ha. and the S.D. $\pm$ 106 cu.m. The methods and equipment used and the accuracy of the results are discussed.

2192. PAELINCK, P. Note sur l'estimation du volume des peuplements à limba (*Terminalia superba*) au Mayumbe, à l'aide des photos aériennes. **[Stand volume estimates of *T. superba* at Mayumbe from aerial photographs.]** *Bull. agric. Congo belge* 49 (4), 1958 (1045–54). 1 ref. [F.du.]

The results obtained by 2 interpreters, using stereographic pairs of photographs (scale 1 : 33,000–49,000) taken with an infra-red lens, are compared and the photo-interpretation characters of the species detailed. Crown diameter and tree height are rejected in favour of % canopy density (d), for measuring which a 7 × 7-mm. grid is preferred to one of 4 × 4 or 10 × 10 mm. For (d) values of 0–30, 30–70 and 70–100%, the corresponding volumes in cu.m./ha. were 20, 100, and 200 respectively. Results are encouraging but ought to be read with much caution; for grand totals of < 30,000 cu.m. the error is $\pm$ 30% and for individual stands 50%.

2193. LE RAY, J. Aspects et possibilités de la photographie aérienne en zone de forêt dense africaine. **[Some aspects and possibilities of aerial photography as applied to dense African forests.]** *Bois For. Trop.* No. 61, 1958 (27–33). [F.]

Briefly discusses some of the difficulties encountered, requisite weather conditions, and the use of aerial photographs in planning logging operations, and gives details of scales, costs etc. of two examples of aerial photography carried out in Gabon and the Ivory Coast by the Institut Géographique National for private companies.

2194. SAMOJLOVIČ, G. G. Aérovizual'nye priznaki lesov v bassejne reki Abakan Hakasskoj Avtonomnoj Oblasti. **[Visual characteristics of forests in the Abakan river basin, Khakass Autonomous Region [S.W. Siberia] as seen from the air.]** *Bot. Ž.* 43 (9), 1958 (1304–10). [Russ.]

Describes the forests (mainly *Abies sibirica* and *Pinus sibirica*, with a few other conifers and broad-leaved species in mixtures and pure stands), and discusses the observable features of crown dimensions, shape and colouring (to assist species identification), giving estimated stand densities.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

61. Forest Management: General, Theory and Principles

See also Nos. 1625, 1633, 2173, 2671.

2195. LIU, S.-H. **Management of the forest resources of Taiwan.** *Spec. Bull. Taiwan For. Res. Inst.* No. 1, 1956. pp. 60. 23 refs. [E.e.chin.]

Discusses present practice and makes recommendations on: inventories and cruising; management subdivisions; determination of site quality, of normality, and of permissible cut; application of felling regulations; and preparation of working plans.

2196. WYLIE, N. **Oak.** *Forestry* 31 (2), 1958 (184–92). 1 ref.

Four basic stages in the life of the Oak wood (*Quercus robur* and *Q. petraea*) are defined and the factors which should influence the manager's mind when he weighs density of stocking and length of bole against rotation to meet his particular requirements are considered briefly in non-technical language. *Author's summary.*

2197. PETKOV, P. D., and PEEV, P. Izučavanija vărhu tehničeskata zrjalost na blagunovite nasaždenija v našite dăbovi visokostăbleni gori. **[Investigation on the technical maturity of stands of *Quercus conferta* in high forests in Bulgaria.]** *Nauč. Trud. lesoteh. Inst., Sofia* No. 5, 1957 (7–33). 11 refs. [Bulg.russ.]

Using data from 90 sample plots, tabulates the volume, m.a.i. and c.a.i., by assortment classes, for stands of *Quercus conferta* aged 40, 50, 60 . . . 140 years, for site classes I to V. Also tabulates these values by groups of assortments to determine the technical maturity of stands of the different site classes.

2198. SPEIDEL, G. Einfluss der Flächengrösse auf die Leistungsfähigkeit eines Bestandes. **[The effect of area on the [volume and financial] yield of a stand.]** *Allg. Forstzeitschr.* 13 (44), 1958 (633–7). 3 refs. [G.g.]

It is thought that in W. Germany areas of sub-compartments are tending to diminish, with adverse consequences due to edge effects, interference of neighbouring stands, sorting and selling difficulties and increased costs of logging, cultivating etc., only partly compensated by greater flexibility and greater safety. The minimum for efficiency is though to be about 1 ha.

62. Working Plans. Annual or Periodic Yield. Yield Regulation

2199. SCHMIDT. Aus den Ergebnissen der Betriebsregelung im Forstamt Erdmannshausen zum 1. Oktober 1955. **[Some findings of the working plan for the Erdmannshausen forest district dated 1 Oct. 1955.]** *Aus dem Walde, Hannover* No. 2, 1958 (17–61 + 1 map, 4 photos, 1 gph.). 14 refs. [G.g.]

Describes the present state of stands and sites (80% of which are on *Flottsand*—i.e. very fine, dense sands of varying degrees of depth, podzolization and moistness), discusses their development as a result of Erdmann's silvicultural methods and subsequent modifications, with special reference to two-storeyed mixtures. Though the % of Pine was reduced from 76 in 1895 to ca. 30, it is still the commonest species. The effect on yield of site factors, structure, lower storey, previous stocking etc., is analysed. [Cf. *F.A.* 18 No. 1582.] *From author's summary.*

2200. PATERSON, D. B. **A study in stand structure and management of irregular forests.** *Bull. For. Dep. Univ. Edinb.* No. 5, 1958. pp. 53. 23 refs.

The aim of the bulletin is to examine some of the problems that will arise in the management of irregular forest in Britain, and to propose some practical solutions. The subjects discussed are: methods of management; size of unit to which they may be applied; desirable size of compartment; conventional volume table; frequency of felling cycle and inventory; and the calculation of yield. In more detail, the application of the *méthode du contrôle* is discussed, and two examples of its use in Britain are described. It appears to be economic to operate the full method for areas up to 600 acres, but some form of sampling of compartments would have to be introduced for larger areas. Compartments of 15–35 acres are desirable. Intervals between inventories of 6 years in coniferous and 8 years in deciduous forests are recommended. Provisional ideal growing stocks are proposed for both coniferous and deciduous forests in Britain. *From author's summary.*

64. Forestry as a Business: General

See also No. 2222.

2201. AARESTRUP-FREDERIKSEN, J. Rente i reproducerende skovbrug. **[The rate of interest in sustained-yield forestry.]** *Dansk Skovforen. Tidsskr.* 43 (8), 1958 (380–99). [Dan.dan.e.]

[Cf. *F.A.* 19 No. 2178.] The main factors considered in relation to the principle that capital invested in forest purchase shall have the same real value as that invested in securities, are the long-term interest rate on securities, an inflation factor, a price factor, and other factors affecting rate of interest.

65. Special Business Problems of Timber-Growing. Calculation of Costs and Profitability. Valuation

See also Nos. 1495, 1661, 1663, 1756, 1770, 1775, 1998, 2222, 2673.

2202. PORTALIS, J. R. Aspectos económicos de la plantación. **[Economic aspects of establishing plantations.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 268–200, 1957. pp. 14. [Span.]

Some estimates of costs and returns in the cultivation of Eucalypts in Argentina.

2203. GRAH, R. F. **Some aspects of initial stocking on financial yield from even-aged Douglas-Fir stands.** *Abstr. of thesis*, in *Dissert. Abstr.* 19 (3), 1958 (401). O.R.S.

The study was carried out by establishing 4 hypothetical models of natural stands, each representing a level of initial stocking (based on number of uniformly distributed crop trees at 20 years) ranging from 25 to 100% of yield-table values. The models are projected to 100 years using Briegleb's approach-towards-normality equations. Volume and quality characteristics (the latter determined by applying standard log-grading criteria to the volume in each model) at 10-year intervals are summarized. Pruning and fill-in planting were applied. Values were placed on the volumes in each log-grade category, using current market prices. Economic analysis of the effects of initial stocking was undertaken by calculation of soil expectation values for each of the models at the end of each 10-year period. Results include the following: range of initial stocking did not affect net volume production at normal harvesting ages but did affect quality, understocked stands having larger knots and excessive amounts of fast-grown material; the effect of pruning in up-grading logs was greatest in fully stocked stands, the fast-grown material limiting up-grading in understocked stands; the maximum reduction in soil expectation value caused by low initial stocking was $44; pruning was economically effective in overcoming value deficiency in poorly stocked stands but was most profitable in fully stocked ones on good sites; fill-in planting alone was profitable only on stands of very low initial stocking, but in conjunction with pruning was profitable over a broader range of stockings.

2204. WARD, W. W. **A mensurational and economic study of thinning in the Carbaugh White Pine plantation.** *Res. Pap. Pa. St. For. Sch.* No. 26, 1958. pp. 16. 5 refs.

The plantation, established in 1913 with *Pinus strobus* seedlings at 4 × 4-ft. spacing, was thinned from below for pulpwood in 1948–51, and in 1955–56 a crown thinning was made, using the thinnings for pulpwood or sawlogs. Comparison of relative financial returns from utilizing small trees for sawlogs or pulpwood showed that both operator and landowner received almost 4 times as much from sawlog production.

2205. SASSE, O. Ergebnisse der Fräsenbuchführung im Regierungsbezirk Lüneburg. **[Results of cost accounting for rotary cultivator work in the Lüneburg administrative region.]** *Forst- u. Holzw.* 13 (19), 1958 (387–91). 4 refs. [G.g.]

Detailed analysis of the costs (fuel, other materials, insurance etc., depreciation, interest and wages) of light and heavy rotary cultivators used with 2-wheeled tractors in 1956 and 1957 showed that, for the latter year, light machines (tractor 4–5 h.p.) cost DM.5.87/working hour, and heavy machines (tractor 9–12 h.p.) DM.6.87. Subsequent increases in wages raise these sums to ca. DM.6.40 and 7.40 respectively.

2206. GROB, H. Wertermittlung von kleineren Privatwaldparzellen. **[Valuation of small private woodlots.]** *Schweiz. Z. Forstw.* 109 (10), 1958 (581–7). [G.f.]

Expresses the view that valuation of such woodlots, usually in the interest of farmer owners or purchasers, should not be based on textbook methods but on the value of the growing stock as it could not unreasonably be realized within the next few years, and give some hints for a quick interpretation of site and stand characteristics.

2207. DUMAY, L. Le calcul en chaîne des valeurs foncières. **[The serial calculation of land values.]** *Travaux des Sections Pédologie et Agrologie, Service des Études Scientifiques, Alger, Hors série* No. 3, 1957. pp. 27. [F.]

Arising out of the need to know whether the price of irrigation water in Algeria is such as to make the cultivation of long-term crops (particularly tree crops) profitable, the author develops the idea of 'serial' calculation of land values, i.e. the year-by-year analysis of values from the establishment to the harvesting of the crop.

2208. OSTWALD, H. Kulturkosten und Walderwartungswert. **[Regeneration costs and forest expectation value.]** *Allg. Forstzeitschr.* 13 (43), 1958 (628–30). 1 ref. [G.]

Argues that the present principle of forest valuation according to Faustmann's formula needs modification, proposes a formula based on E. Ostwald, which assumes that the reforested soil, and not the soil after clear felling, represents the basic capital, i.e. equals the discounted value of the net future earnings less regeneration costs, and discusses the application of these valuation principles to the insurance of plantations and young stands.

2209. ABETZ, K. Forsteinrichtung und Einheitsbewertung. **[Forest management and assessment of forests for taxation [in W. Germany].]** *Allg. Forstzeitschr.* 13 (46), 1958 (665–70). [G.]

A theoretical discussion, in which the present age-class method of assessment, based on the yield from a normal age distribution adjusted to the actual distribution, is defended against the advocates of valuation by reference to permissible cut. The factors entering into forest valuation, e.g. age (actual or economic), site class, density, costs etc., are dealt with [cf. *F.A.* 16 No. 3293].

2210. **Douglas Fir appraisal.** *Timberman* 59 (10), 1958 (43–4, 46). 1 ref.

In quoting stumpage in its sales advertisements, the U.S. Forest Service (Pacific Northwest) has introduced a new method of calculation, here illustrated with 6 tables of 1956 data from mill studies and plywood production-cost surveys. The tables cover (1) veneer recovery by grades, as a % of total veneer production, by peeler-log classes, with recovery ratio for each of the latter [see *F.A.* 19 No. 2379];

(2) the % recovery of lumber grades from sawlogs by 3-inch diameter classes; (3) industrial production of plywood by grades, thicknesses, and interior and exterior quality; (4) regional mean prices for the assortments of (3); (5) expected realizations, 1956 ($/1000 sq. ft.) by log diameter and 1-, 2- and 3-peeler classes; (6) lumber prices, 1956, by grades; and, derived from these data, (7) and (8) 'pond values' (2nd quarter 1957) of peeler logs and sawlogs respectively. In the stumpage appraisal cruises each tract for sale is given a mean pond value per 1000 bd. ft. derived from weighted means of the grades and sizes of the logs inventoried. From this mean pond value the logging, transport and road construction costs are subtracted leaving a conversion return (c.r.) which is split between stumpage and profit-risk allowance by the use of a 'profit ratio', e.g. a profit ratio of 10% means that 10% of costs + stumpage is the profit-risk allowance. Subtraction of the profit-risk allowance from c.r. leaves the appraisal stumpage rate.

2211. WALKER, A. H. **[New South Wales timber sales policy.]** *Aust. Timb. J.* 24 (7), 1958 (5 . . . 12).

A paper presented at the Eastern States Timber Industry Stabilization Conference covers the history of forest royalty assessment in N.S.W. from 1801.

2212. KREBS, E. Besondere Probleme der Waldwertrechnung. **[Special problems of forest valuation.]** *Schweiz. Z. Forstw.* 109 (10), 1958 (569–80). [G.f.]

Criticizes the lack of uniformity in Switzerland in assessing compensation in the case of expropriations, particularly for power lines, recommends the issue of general directives and discusses the chief factors involved—premature felling, loss of yield, side effects and inconvenience. The question of falling money values is also touched upon.

66. Costing of Logging Operations

See Nos. 1906, 2214.

67. Assessment of Financial Results; Book-keeping and Accountancy; Business Statistics; Short-Term Planning and Financing

See also No. 2662.

2213. FRAUENDORFER, R. Zur Frage der Bewertung des forstlichen Betriebsvermögens. **[Valuation of the capital of a forest enterprise.]** *Cbl. ges. Forstw.* 75 (2), 1958 (116–41). 36 refs. [G.g.]

Favours valuation as a running concern by capitalization of the market value of p.a.i., and describes, with an example, the determination of the basic data by a method of systematic stratified sampling [cf. *F.A.* 19 No. 4614] and an analysis of assortments obtained and their costs, based on wage sheets etc.

68. Administration and Organization of Forest Enterprises

681. National (Federal, State) Forest Services and Administration

See Nos. 1421, 2662.

685. Planning and Organization of Telecommunications

See No. 1936.

686. Planning and Organization of Buildings, Transport Installations (Roads etc.)

See also No. 2167.

2214. GRAYSON, A. J. **Road density in extraction planning.** *Emp. For. Rev.* 37 (3), 1958 (305–10). 10 refs.

A formula showing optimum road density in a regularly exploited forest area is given, based primarily on costs of road construction and off-the-road haul, and the volumes to be extracted. The author stresses that the costs and returns associated with the actual growing of timber are not relevant to questions of transport costs, which should be considered separately.

2215. BENEŠ, J. Vztahy mezi dopravou dřevní hmoty a stavbou lesních cest. **[The relations between timber extraction and forest roadbuilding.]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (5), 1958 (299–328). 28 refs. [Cz.cz.russ.e.]

A theoretical study to determine the optimum forest road density under Czechoslovakian conditions, containing nomograms for application in mountainous and hilly terrain for conifers and broadleaved species. The max. justifiable length of new, hard-surfaced road is calculated at 15 m./ha.; the average length will be ca. 10 m./ha.

2216. KORUNOV, M. M. O naivygodnejšem rasstojanii meždu lesovoznymi usami. **[On the most suitable distance between spur roads for timber extraction.]** *Lesn. Prom.* 1958 (9), (12–5). 2 refs. [Russ.]

A detailed theoretical study to determine the optimum density of spur roads in felling areas. Formulae are developed for the distance between roads (*a*) when fellings are 'concentrated', and (*b*) when they are done on a chess-board pattern, and also for various arrangements of skidding trails.

687. Planning and Organization of the Transport of Men, Supplies and Equipment

See No. 1899.

7. MARKETING. ECONOMICS OF TRANSPORT AND THE FOREST PRODUCTS INDUSTRIES

See also Nos. 2610, 2624, 2642, 2647.

71. Marketing of Forest Products: General

2217. SPEER, J. Der Holzmarkt im Zeitalter der Grossindustrie. **[The wood and timber market in the era of big industry.]** *Repr.* from *Jahrbücher für Nationalökonomie und Statistik*, *Stuttgart* 170 (1/3), 1958 (154–93). 46 refs. [G.g.]

Analyses the peculiarities inherent in the situation, with its large numbers of highly differentiated, largely unorganized suppliers and consumers, of which only the state forests and large consumers of pulpwood, mining timber, and sleepers have a near-monopolistic position, and where transport and local conditions play an important role. Another difference from other raw materials, which makes for instability of prices and market vulnerability, is the impossibility of costing assortments and the considerations other than economic influencing supply.

2218. WIKSTROM, J. H. **The market outlook for Lodgepole Pine [in the U.S.A.].** *J. For.* 56 (9), 1958 (643–6). 4 refs.

Examines its properties, consumption trends etc., and considers that Lodgepole Pine is a good long-term market prospect, though some problems (e.g. the cost of handling small trees, and marketing of narrow boards) need attention.

72. The Quantitative Aspects of Marketing. Demand, Consumption and Supply

See also Nos. 2229, 2403, 2551.

2219. **Timber statistics 1957.** Organisation for European Economic Co-operation, Paris. 1958. pp. 71. [E.F.] [Cf. *F.A.* 19 No. 868.]

2220. **Statistics on tropical timber, 1956. Imports by O.E.E.C. member countries. Production and exports by overseas territories.** Organisation for European Economic Cooperation, Paris. 1958. pp. 90. [E.F.] Price 6*s*. ($1.00, *Fr.F.*350, *Fr.Swiss.*3).

Part 1 gives imports by countries and by species, Part 2 production and exports by overseas territories and dependencies (British, French, Portuguese, Belgian and Netherlands).

2221. FRIEDRICH, A. G. Besoins et importations de l'Allemagne occidentale en bois ronds d'Afrique. **[Western Germany's requirements and imports of logs from Africa.]** *Bois For. Trop.* No. 61, 1958 (51–8). 2 refs. [F.g.e.span.]

2222. ERNST, C. Strukturwandlungen auf dem Holzmarkt und ihre Auswirkungen auf die Forstwirtschaft. **[Structural changes in the market for wood, and how they affect forestry.]** *Holz-Zbl.* 84 (107), 1958 (1347–9). [G.]

A lecture surveying trends in the uses of wood as such, in the fibreboard and pulp industries etc., and the practical conclusions to be drawn as to choice of species, silvicultural treatments, length of rotation etc.

2223. RIBEIRO, S. F. PEREIRA. Actividade madeireira no Enclave de Cabinda. **[The timber industry in the Cabinda district.]** *Agros* 41 (4), 1958 (240–55). 7 refs. [Port.]

About 90% of the timber exported from Angola comes from the Cabinda district, where are situated some of the richest forests of the country. The main timbers exploited are Limba (*Terminalia superba*) and Tola Branca (*Gossweilerodendron balsamiferum*). Figures are given for exports of all timbers from Cabinda between 1949 and 1955, with notes on methods of exploitation, extraction, transport, costs and grading. Sawn timber constitutes only ca. 10% of the total exports. The author considers that efforts should be made to exploit a wider variety of species and to build up the sawmilling industry. A list of the principal timbers is presented with their native names. The characteristics and properties of Menga-menga (*Staudtia gabonensis*) are also described.

73. Prices

See also Nos. 2154, 2210.

2224. **Timber price statistics 1958.** European Office of the United Nations, Geneva. No. 58.II.E/Mim 19, 1958. pp. 18 + 14 tbls., 37 gphs.

Covers most of the European member countries and contains price series back to 1948. The tables and graphs give general price indices, and prices of fuelwood, pulpwood, coniferous sawlogs, pitprops and sawn softwoods.

74. Trade Policy

See also No. 2683.

2225. **Monopolies Commission Report [on timber trade in the U.K.].** *Timb. Tr. J.* 226 (4279), 1958 (63–7). 1 ref.

The Commission unanimously finds that, though the restrictive agreements and undertakings relating to hardwoods, softwoods, and plywood which their 1953 report recommended should be abrogated, were in fact abrogated in 1954, they have since been replaced by similar arrangements except in the plywood trade.

2226. Normas para la importación de maderas. **[Timber import regulations.]** *Bol. argent. for.* 16 (165), 1958 (11–3). 2 refs. [Span.]

These regulations, published by the Central Bank of the Argentine Republic, include the tolerances allowed on sawn or squared *Araucaria angustifolia* (3 qualities) and Chilean *Pinus radiata* (one quality) and general grades for sawn timber and logs separately, for a group of 11 species imported from frontier countries.

78. Economics of Transport

2227. MANTEL, K. Probleme des Langstreckentransports von Holz in Wettbewerb der Landverkehrsträger. **[Competition of road and rail for the long-distance transport of wood.]** *Holz-Zbl.* 84 (116), 1958 (1481–6). [G.g.]

Presents data on the increasing proportions of wood assortments and wood products being moved by road in spite of (generally) equal tariffs on German railways and long-distance road haulage, and discusses changes in railway freight rates which might counter-balance the advantages of road haulage in loading costs.

2228. WILLIAMS, J. H. **The equalization of [railway] freight rates [in Canada].** *Timber of Canada* 19 (10), 1958 (30–2). 3 refs.

In spite of policy, 3 different lumber mileage scales exist (in British Columbia-Prairies; E. Canada except Maritimes; part of Ontario-Quebec). These arose from competition (summer water transport in the east and road transport in Ontario-Quebec) and from the now abolished mountain differential (the haul cost in B.C.). The Transport Commission's problem of further equalization and its effects are outlined.

79. Economics of the Forest Products Industries

See also Nos. 2399–2401, 2444, 2532, 2550–1, 2573, 2624.

2229. ERICKSON, H. D. **Wood supply and production of the pulp industry in the state of Washington: an analysis of consumption, species, classes of wood, trends and pulp production.** *Circ. Inst. For. Prod. Wash.* No. 32, 1957. pp. 40. 14 refs.

2230. SCHWIERTZ, H. F. **Production of wood particle board.** *Timb. Tr. J.* 226 (4280), 1958 (74–5).

Presents data on world production and a breakdown of working costs for one continuously operating and two discontinuous-operation British plants. Covers production capacity, labour requirements, raw material, labour and power, maintenance, total production costs, overheads and ex-factory cost on day, ton and sq. ft. bases. These last were 7·25, 8·8 and 7·33 d./sq. ft. respectively.

8. FOREST PRODUCTS AND THEIR UTILIZATION

See also Nos. 1520, 1522, 1631–2, 2647.

2231. **Partial list of [U.S.] Government publications of interest to architects, builders, engineers, and retail lumbermen.** *Rep. U.S. For. Prod. Lab., Madison* No. 1081, 1958. pp. 18. P.R.

Lists publications on fungus defects, glued wood construction, the growth and identification of wood, joints, mechanical properties of wood, screening, finishing, preservation etc.

2232. **Report of committee D-7 on wood.** American Society for Testing Materials, Philadelphia, Pa. 1958. pp. 18. P.R.

Reports on proposed standards and revisions, and gives in full tentative definitions of terms relating to wood-base fibre and particle panel materials, proposed revised tentative specifications for wood paving blocks, and proposed revised standard methods of test for glue joints in laminated wood for exterior use.

2233. **Program of work 1958–1959 of the Forest Products Laboratories of Canada, Ottawa and Vancouver.** Forestry Branch, Department of Northern Affairs and National Resources, Ottawa. 1958. pp. 75.

2234. **Dominion Laboratory [D.S.I.R., New Zealand].** *Inform. Ser. Dep. sci. industr. Res. N.Z.* No. 17, 1958. pp. 32.

Discusses the functions and work of the various sections, including research by the wood chemistry section on the resins of *Podocarpus* and *Dacrydium* spp., the extractives of exotic Pines grown in New Zealand, and the decay resistance of, e.g. *Pinus* and *Larix* spp.

2235. Dreiländer Holztagung. **[Three-countries wood conference.]** *Ber. dtsch. Ges. Holzforsch.* No. 2/58, 1958. pp. 49. [G.] P.R.

Summarizes papers (most of them based on material since published) read at the 1956 meeting of the German, Austrian and Swiss Wood Research Societies, including a report on heat-insulation investigations on houses of different materials, including wood, wood-wool and fibreboards (*H. Reiter*; *P. Haller*), and on wood/metal gluing tests (*E. Staudacher*).

2236. Festskrift tillägnad Tekn. dr. Gunnar Sundblad på hans 70-årsdag. **[An issue dedicated to G. Sundblad on his 70th birthday.]** *Svensk PappTidn.* 61 (18*b*), 1958 (603–826). [Sw.,E., or G., sw.e.g.] P.R.

Includes the following papers, most of which are illustrated and contain data in graphs and tables, and lists of references: Forest tree seed: how AB Bruk supplies its seed requirements (*T. Arnborg*) [including data on the division of the company's forests into various zones, methods of collection and storage, the use of seed orchards, etc.]; Heartwood and heartwood chemistry (*H. Erdtman*); The fine structure of wood fibres and tracheids (*H. Meier*) [illustrated by photomicrographs of Pine, Spruce and Birch]; Estimation of phenolic hydroxyl groups in lignin (*E. Adler*, *S. Hernestam* and *I. Walldén*); The reactive groups of lignin (*J. Gierer*); Recent developments in the Rheinau wood chemistry process (*E. Hägglund* and *T. Riehm*); Lignin-carbohydrate links (*B. O. Lindgren*); Hemicellulose in wood (*B. Lindberg*); Observations regarding some properties of coniferous wood (*A. Asplund*) [reporting results of experiments on mechanical defibration of Spruce and subsequent fibrillation of the fibre pulp, obtained at ca. 160° C., and illustrating them by photomicrographs and drawings]; Stretching-plates [for fixing the blades to the sash] in frame saws (*B. Thunell*) [discussing disadvantages in present practice and suggesting improvements]; The effect of Spruce quality [knot content and knot size] on sulphite pulp (*P. Nylinder*); The effect of chipping on pulp quality (*N. Hartler*) [discussing the effect of chip dimensions, compression wood, and mechanical treatment of chips on different types of pulp]; Grinding experiments with 3 stones of different quality (*O. Brauns*); and Some attempts to prepare anion exchangers from lignin (*T. Enkvist*).

81. Wood and Bark: Structure and Properties

2237. PEARSON, R. G., and WILLIAMS, E. J. **A review of methods for the sampling of timber.** *For. Prod. J.* 8 (9), 1958 (263–8). 10 refs.

Discusses the selection of samples for timber-testing to determine the properties of a species, stressing the need for obtaining samples from as many as possible randomly selected trees, taking into account differences in growth region, etc. If this is done, the number of samples per tree, whose location within the tree should also be chosen at random, need not be large. The method used by Armstrong [cf. *F.A.* 17 No. 3230] to compute standard error is criticized as not making allowances for variations between trees.

810. General Information on Woods

See also Nos. 1495, 1506–7, 1524, 2223.

2238. HARRAR, E. S. **Hough's Encyclopaedia of American woods. Vol. I.** ,Robert Speller & Sons, New York. 1957. pp. 204. 3 pp. of refs. L.A.L.

This edition is to consist of 15 volumes, each containing a large number of wood sections by R. B. Hough. Each species is described in 3 parts, the first including historical notes and discussing its relative importance, the second describing the tree, its habit, diagnostic features, ornamental value and distribution (with a map), and the third the wood, its anatomy, physical properties (with tabulated data), and utilization. The first volume deals with 25 coniferous species.

2239. LINK, R. R. Estudio sobre maderas indígenas. **[Study of native timbers.]** *Silvicultura, Uruguay* No. 5, 1954 (7–62). [Span.e.]

Gives data on structure and mechanical properties of the following woods: *Luehea divaricata, Terminalia australis, Prosopis* spp., *Aspidosperma quebracho-blanco, Eugenia myrcianthes, E. cisplatensis, Ruprechtia polystachya, R. salicifolia, Salix humboldtiana, Nectandra membranacea*, and *Lonchocarpus nitidus*.

2240. **Properties of home grown Japanese Larch (*Larix kaempferi*) [*L. leptolepis*]. Progress reports Nos. 1–4.** Forest Products Research Laboratory, Princes Risborough. 1952, pp. 17 + 14 photos, 1 dgm.; 1957, pp. 8 + 1 plate; 1958, pp. 13 + 8 photos; 1958, pp. 13 + 8 photos.

(1) Material from Consignment No. 733, 20 trees, 48 years old, 6 identified as *L. leptolepis*, 5 as *L. potaninii* and the remainder doubtful (as satisfactory herbarium material was not available), all from Stourton, Warminster, showed durability within the range for *L. decidua*, good working and seasoning properties, and strength properties superior to those of imported Redwood. First- and second-grade material is suitable for carcassing timber in building, and third-grade for wagon and lorry flooring and crate wood, but less so for box making because of a tendency to split when nailed. It should be useful for fencing and gates and other outside work. No difference was found between the two species. (2) Consignment No. 880, 5 trees, 50 years old, from Penrith, was slower grown, lighter in weight, less strong and less durable than (1). (3) Consignment No. 931, 30 trees, 34 years old, from Tintern forest, was stronger than (2). It proved similar in strength to Douglas Fir and could be used grade for grade for the same purposes. If it were pruned early, it could give good joinery timber. (4) Consignment No. 934, 17 trees, 55 years old, was slower grown than (3), of slightly higher density and similar strength and working properties and produced the same % of material for each grade. It seasoned with little splitting and varying amounts of twist. Clear material would be suitable for joinery.

2241. **Properties of thinnings of home-grown Sitka Spruce (*Picea sitchensis*). Progress report 7—Consignment No. 879.** Forest Products Research Laboratory, Princes Risborough. 1957. pp. 5 + 1 plate.

[Cf. *F.A.* 17 No. 4373.] This consignment is considered separately because the plantation from Parc Stalwyn wood, near Llanrwst, was seriously underthinned and growth rate was slow. Similar in specific gravity to faster-grown timber, it showed higher values in equivalent fibre stress at maximum load, modulus of elasticity and compression parallel to the grain, a considerably lower value for hardness, and a slightly lower one for impact bending strength. It is concluded that the difference in growth rate makes no appreciable difference to wood quality.

2242. HAFIĆ, V. Crveni hrast—*Q. borealis* Michx. (Anatomska građa i neka tehnička svojstva). **[The anatomical structure and some technical properties of *Quercus borealis* wood.]** *Šumarstvo* 11 (3/4), 1958 (186–90). 8 refs. [Serb.e.f.]

Gives some data on anatomical characters and strength properties from analysis of 5 young suppressed trees from Belje (Serbia). A comparison with data on *Q. robur* from German literature showed the latter to have much higher strength properties.

2243. LAMB, G. N. **Foreign woods.** *Wood, Chicago* 63 (10), 1958 (42). P.R.

Fustic (*Chlorophora tinctoria*); *Libidibia* sp.

2244. **Specimen Woods Nos. 274–275.** *Suppls.* to *Wood* 23 (10; 11), 1958. Each pp. 2.

Sabicu (*Lysiloma latisiliqua*); White Cypress Pine (*Callitris glauca*).

2245. La page des bois tropicaux. Eyong. **[Tropical woods. *Sterculia oblonga* and *S. elegantiflora*.]** *Rev. Bois Appl.* 13 (9/10), 1958 (60). [F.]

2246. KOHN, J. **Properties and uses of Balsa.** *For. Prod. J.* 8 (8), 1958 (27*A*–30*A*). 13 refs.

Tabulates strength properties at 12% m.c. for wood of densities from 6 to 15½ lb./cu. ft. and its thermal properties, and discusses durability, workability etc. Chief uses instanced includ marine equipment, models, structural insulation, sandwich and core materials for aircraft, and reinforced plastics for boats and containers.

2247. HAUGHTON-SHEPPARD, P. C. **A note on African Blackwood—*Dalbergia melanoxylon*.** *Emp. For. Rev.* 37 (3), 1958 (327–30).

Notes on occurrence, primary conversion, uses (e.g. for local carvings and musical instruments), defects, seasoning, grading and packing.

2248. ARKWRIGHT, P. **Know your timber: No. 56. Coachwood [*Ceratopetalum apetalum*].** *Woodwkg. Ind.* 15 (10), 1958 (565). P.R.

2249. WILLIAMS, E. **Timbers of New South Wales—Black Bean, *Castanospermum australe* A. Cunn.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 11 (1/2), 1958 (2–6). 2 refs.

Covers distribution, description of the tree and timber; seasoning (with recommended kiln schedule); durability; mechanical, physical and working properties; and uses (cabinet, carving, turning and moulding work and figured veneers).

2250. GHELMEZIU, N. Lemnul de cătina de riu (*Hippophaë rhamnoides* L., fam. Eleagnaceae). **[The wood of *H. rhamnoides*.]** *Rev. Pădurilor* 1958 (5), (267–72). 16 refs. [Rum.russ.g.f.e.]

Gives photomicrographs, chemical analysis, and data on physical and mechanical properties of the wood (with comparative data for other species) and suggestions for uses (turnery etc.).

811. Structure, Identification

See also No. 2236.

2251. **List of publications on the growth, structure and identification of wood.** *Rep. U.S. For. Prod. Lab., Madison* No. 177, 1958. pp. 29.

The references (mainly to U.S. works) are grouped under: General and miscellaneous; Structure and identification; Relation of wood structure to its properties and uses; Relation of growth conditions to wood quality; Technique; and Some books about wood (U.S. and British Commonwealth).

2252. BROWN, A. G. **The extraction of large wood samples from living trees.** *J. For.* 56 (10), 1958 (764). 1 ref.

In order to obtain samples from bark to pith, having a minimum cross-section of 2 × 1 in., three $\frac{3}{4}$-in. holes, sited at 3 corners of the rectangle, are bored right through the tree. A modified bow-saw with a blade turning through 90° can then be used to saw out the sample. After threading the blade through the middle hole, cuts are made to each of the other two, from which further cuts are made in turn to complete the rectangle. A sample can be taken in ca. 1 hr. The hole in the tree should be treated with preservative and plugged. [Cf. *F.A.* 16 No. 3340.]

2253. SHELLHORN, S. L., and HOSHAW, R. W. **Rapid method for preparing wood sections.** *Stain Technology* 32 (4), 1957 (157–60). O.R.S.

The wood specimens are embedded in a larger block of Pine or Fir and sectioned with a large carpenter's plane. Safranin, fast green and orange G stains are recommended. Photomicrographs of sections of *Fraxinus velutina*, *Larrea tridentata* and *Prosopis juliflora* prepared by this method are given. Cross-sections ranged in thickness from 20 to 25 μ and longitudinal sections from 10 to 15 μ.

2254. BOUTELJE, J. B. **The wood anatomy of *Libocedrus* Endl., *s. lat.*, and *Fitzroya* J. D. Hook.** *Acta Horti Bergiani, Uppsala* 17 (6), 1955 (177–216 + 8 plates). 46 refs. [E.e.] L.S.

Presents an analysis, supported by photomicrographs of the wood of *Heyderia*, *Pilgerodendron*, *Austrocedrus*, *Libocedrus s.s.*, *Papuacedrus* and *Fitzroya*, which supports Li's division of the Cupressaceae into 2 sub-families [cf. *F.A.* 14 No. 1975]. Thick nodular end-walls of the wood parenchyma cells, and the occurrence of indentures, generally characterize the northern genera (except *Tetraclinis*); the absence or weak development of these features, the southern genera. The position of *Fitzroya* is, however, still uncertain, and may be intermediate. *From author's summary.*

2255. BUDKEVIČ, E. V. Anatomičeskoe stroenie drevesiny *Ducampopinus krempfii* (Lecomte) A. Chevalier. **[The anatomy of *Pinus krempfii*.]** *Bot. Ž.* 43 (8), 1958 (1156–60 + 1 plate). 11 refs. [Russ.]

Reviews literature on the nomenclature and systematic position of this peculiar species [cf. *F.A.* 12 No. 186; 13 No. 1895; 14 No. 3092], and gives an illustrated description of its wood anatomy based on a specimen of mature wood from S. Vietnam (obtained from the Centre Technique Forestier Tropicale). The wood differs in certain features, e.g. presence of some ray tracheids and horizontal resin canals, from the branch wood described by Buchholz. It also differs from that of any contemporary Pine in possessing xylem parenchyma and taxodioid cross-field pits, and these characters support the view that it should be classified as a separate genus, *Ducampopinus*.

2256. FERREIRINHA, M. P. Elementos de anatomia de madeiras—folhosas portuguesas. **[Elements of wood anatomy—Portuguese hardwoods.]** *Mem. Junta Invest. Ultramar, Lisboa* (*Ser. 2*) 1958 (3). pp. 135 + 1 tbl., 25 plates. 56 refs. [Port.]

Deals with the history of the study of wood anatomy, the objects, materials and methods of such studies, and the influence of structure on the properties of the wood; and gives in detail an exposition of the macroscopic and microscopic properties of hardwoods, illustrated by reference to Portuguese native and overseas timbers. A list of scientific and native names of these woods is appended.

2257. COZZO, D., and RODRIGUEZ, E. M. Anatomía comparada de la madera de 11 especies de *Eucalyptus* cultivadas en la Argentina. **[Comparative anatomy of the timber of 11 species of *Eucalyptus* grown in Argentina.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 249–200, 1957. pp. 19. 12 refs. [Span.]

811.1. Anatomical Elements and Tissues

See also Nos. 1469, 1809, 1873, 2271–3, 2289, 2353, 2358, 2479, 2554, 2557–61, 2565.

2258. SÁRKÁNY, S., STIEBER, J., and FILLÓ, Z. **Investigations on the wood of Hungarian *Populus* species by means of quantitative xylotomy.** *Annales Universitatis Scientiarum Budapestinensis* (*Sect. Biol.*) No. 1, 1957 (219–29). 10 refs. [E.g.russ.] P.R.

Discusses data on variation in ring width, number and % (by volume) of vessels, and number, %, and dimensions of fibres, of *P. alba*, *P. nigra*, *P.* '*canadensis*', *P. tremula* and *P.* × *robusta* from 8 regions in Hungary. The data on fibre length and increase in fibre volume indicate that Poplars for the pulp and paper industry should not be felled at < 20–25 years.

2259. PINKER, K., and LINSKENS, H. F. Vergleichende Untersuchung der anatomischen und physikalischen Eigenschaften des Holzes von *Populus simonii* und *Populus robusta*. [**Comparative studies on the anatomical and physical properties of *P. simonii* and *P.* × *robusta*.**] *Holz Roh- u. Werkstoff* 16 (9), 1958 (325–7). 8 refs. [G.g.e.] P.R.

The most distinctive anatomical differences proved to be height of rays (*P.* × *robusta* 14–20 cells, *P. simonii* 8–12) and the presence of parenchyma cells only in late wood (*P.* × *robusta*) or in both early and late wood (*P. simonii*). Green density of *P.* × *robusta* ranged from 0·494 to 0·452 and that of *P. simonii* from 0·420 to 0·429 g./c.c. In *P. simonii* a relationship was found between density and volume shrinkage, the lighter wood shrinking less; no such relationship was found for *P.* × *robusta*. Sapwood shrinkage of *P. simonii* was considerably less than that of *P.* × *robusta*.

2260. NORTHCOTE, D. H. **The cell walls of higher plants: their composition, structure and growth.** *Biol. Rev.* 33 (1), 1958 (53–102). 10 pp. of refs. O.R.S.

A broad review of literature on chemical and biological investigations, covering cellulose and α-cellulose, the hemicellulose fraction, structure of hemicellulose components, pectic substances, lignin, development of the cell-wall, distribution of the chemical constituents, organization of the cell-wall and growth of the cell-wall. Much of the information is derived from tree species.

2261. CORRENS, E., WERGIN, W., and RUSCHER, C. Über eine Asymmetrie im Röntgendiagramm verschiedener Holzproben. [**Asymmetry in the X-ray diagrams of different wood samples.**] *Faserforschung und Textiltechnik, Berlin* 7 (12), 1956 (569–70). [G.] L.S.

X-ray diagrams of Poplar and Spruce samples appeared to show an arrangement of cellulose crystallites orientated in other directions than along the fibre axis.

2262. CORRENS, E., WERGIN, W., and RUSCHER, C. Über Strukturunterschiede in den Zellwänden von Laubhölzern. [**Structural differences in the cell-walls of hardwoods.**] *Faserforschung und Textiltechnik, Berlin* 7 (12), 1956 (565–9). 9 refs. [G.g.russ.e.] L.S.

Light microscopy and X-ray diffraction studies of normal and tension wood of *Populus nigra*, *Quercus robur*, *Fagus sylvatica* and *Aesculus hippocastanum* showed that in the (gelatinous) tension-wood layer the cellulose is crystalline and lies almost axially. Cellulose interferences in the residual lignified secondary walls of normal structure in tension wood occur in the form of a 4-point diagram similar to that in normal wood, though this diagram in tension wood is partly obscured by sharp interferences from the gelatinous layer. The cellulose micelles in this secondary-wall layer are arranged in a spiral at a greater angle of inclination than in the gelatinous layer.

2263. WARDROP, A. B., and DAVIES, G. W. **Some anatomical factors relating to the penetration of water into xylem of gymnosperms.** *Repr.* from *Aust. J. Bot.* 6 (2), 1958 (96–102 + 5 plates). 20 refs.

A study has been made of some sapwood specimens of *Pinus radiata* and *Pinus muricata* known to resist penetration by aqueous preservatives but readily penetrated by creosote oil. A few pits only in these specimens showed aspiration. An arbitrary sinkage time has been used as an indication of the penetrability of the wood, and it has been shown that pre-extraction with alcohol and ether greatly reduces the sinkage time in water. In *Pinus radiata* and *Picea* spp. the sinkage time was greatly increased by drying, but this increase did not take place if the specimens were pre-extracted with alcohol and ether. Extraction after drying at 102° C. did not reduce the sinkage time. A study of staining reactions of the wood with Sudan black and Sudan IV indicated the presence of fatty material, removable by successive extractions with alcohol and ether, lining the lumen of pit chambers of the tracheids. This fatty material appeared to be part of a thicker membrane which stained strongly with osmic acid and could be removed only by extraction with urea. Isolation of this osmiophilic membrane and subsequent electron-microscopic examination showed it to have a structure similar to the membrane with 'wart-like' texture described by other workers. *Authors' summary.*

2264. BAILEY, I. W. Die Struktur der Tüpfelmembranen bei den Tracheiden der Koniferen. [**The structure of the pit membranes in conifer tracheids.**] *Holz Roh- u. Werkstoff* 15 (5), 1957 (210–3). 11 refs. [G.e.] P.R.

Discusses 5 recent photomicrographs (× 2900) showing bordered pits (from fresh sapwood, capable of functioning) of *Larix*, *Pinus strobus* and *Tsuga* sp. with indications that the fine structure of their membranes varies considerably not only between genera, but between parts of a tree, and sometimes between neighbouring tracheids, and leading the author to modify somewhat his earlier views, now thought to have over-emphasized the coarser types of visible structure. This structural variability is thought to require careful consideration in the interpretation of electron micrographs and of experiments on the movement of gases, liquids and suspensions through coniferous wood.

2265. LIESE, W. Der Feinbau der Hoftüpfel bei den Laubhölzern. [**The fine structure of bordered pits in hardwoods.**] *Holz Roh- u. Werkstoff* 15 (11), 1957 (449–53). 13 refs. [G.g.e.] P.R.

Discusses the fine structure of intervascular bordered pits of *Fagus sylvatica*, *Betula verrucosa*, *Populus nigra* and *Salix alba*, on the basis of electron-microscopic investigations using an impression technique. The structure of the border resembles that in conifers. The pit membrane shows neither a

visible opening nor torus. The physiological and technical [penetrability etc.] significance of the differences between the pits, particularly as regards the interruption of water columns by air, is discussed.

2266. VASILJEVIĆ, S. Dužina traheida u granicama prstena prirasta. **[Tracheid length within the growth ring.]** *Glasn. šum. Fak., Beograd* No. 10, 1955 (161–90 + 2 plates). 9 refs. [Serb.e.]

In one tree of *Picea abies* the length of successive tracheids in the same row (i.e. originating from the same cambial initial) was measured in 4 growth rings some distance from the pith (mainly between the 70th and 90th rings). It was seen that: (1) tracheid length increased through the ring and then decreased towards its end; (2) in a narrow ring, tracheids did not increase to reach the same length as in a wide ring and therefore the mean length was less; (3) in occasional rows, tracheid length began by being much lower than the average, probably as a result of the division of the cambial initial, but increased rapidly in successive growth rings.

2267. TAMOLANG, F. N., *et al.* **Fiber dimensions of certain Philippine broadleaved and coniferous woods, Palms, and Bamboos. II.** *Tappi* 41 (10), 1958 (614–21). 12 refs. P.R.

[Cf. *F.A.* 19 No. 913.] Gives fibre dimensions and derived values for a further 78 broadleaved and 3 coniferous species, 1 Palm and 1 Bamboo.

2268. SCARAMUZZI, G. Observaciones sobre dimensiones de las fibras leñosas en relación con las condiciones de crecimiento en algunos individuos de *Eucalyptus camaldulensis* Dehn. **[Dimensions of wood fibres in relation to growth conditions in some stems of *E. rostrata*.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 236–200, 1957. pp. 4. [Span.span.]

Dimensions of wood fibres were studied in 3 specimens of *E. rostrata* grown on different sites and given different silvicultural treatments. There were found to be very small differences in the length of the fibres, and small to moderate differences in the length/diameter ratio of the fibres, cell-wall thickness and the cell-wall thickness/lumen ratio, when compared with the general mean of the 3 specimens. The length and the length/diam. ratio of the fibre were slightly greater in the specimen of slowest growth; cell-wall thickness and the cell-wall thickness/lumen ratio of the fibre had, on the other hand, higher values in the specimens of rapid growth.

2269. PEEL, J. D. **Method of measuring the dimensions of fibres of pulpwood species.** *Malay. Forester* 21 (2), 1958 (106–8).

In view of the large number of possible pulpwood species in Malayan forests it is desirable to find a quick and simple method of determining which species are worth detailed study. Examination of 25 wet fibres each from (*a*) a sulphate pulp made from a sample chip taken at waist height, and (*b*) a pulp representative of the whole tree, made from 2-in. discs taken at 2½-ft. intervals along the bole, showed remarkable similarity between the two, provided that samples were taken from mature trees. It is therefore suggested that the pulping of sample chips and examination of the fibres in the resulting pulp is a suitable method of selection of species for further examination.

2270. BACK, E. **Aspects on tracheidal and parenchymatous ray cells in pulpwood conifers. The resin in parenchymatous cells and resin canals of conifers. II.** *Svensk PappTidn.* 61 (17), 1958 (523–30). 20 refs. [E.e.sw.g.] P.R.

[Cf. *F.A.* 17 No. 841.] Reviews the anatomical features and dimensions of xylem rays and ray cells, the characteristics of the pits of parenchyma ray cells, the total ray-cell volume of pulpwood conifers, and the relative volume of tracheid and parenchyma ray cells.

811.2. Special Features and Abnormal Structure

See Nos. 2262, 2325–7, 2355–6.

811.4. Growth Rings. Early and Late Wood

See also Nos. 1582, 1809, 2266, 2359.

2271. LOBŽANIDZE, Ė. D. Pervye ėtapy formirovanija godičnyh kolec drevesiny. **[First stages in the formation of annual rings.]** *Dokl. Akad. Nauk SSSR* 121 (5), 1958 (928–31). 9 refs. [Russ.] A.P.B.

Differentiation of xylem elements was studied in wood samples taken at intervals through the growing season from 74 woody species (7 conifers and 12 each of diffuse- and ring-porous hardwoods are named) growing in Caucasia. The results are reported briefly. In the conifers (1), differentiation took place uniformly and simultaneously round the circumference, the early-wood tracheids forming a continuous zone round the boundary of the previous ring. Lignification (usually beginning after 3–4 days) also proceeded in a continuous zone round the stem. In diffuse-porous species (2) the early wood was formed uniformly round the stem, as in (1), all the elements being differentiated at the same time, so that the cambial zone was delimited by a continuous line, but lignification (after 5–12 days) began with the vessels and extended centrifugally from them to the surrounding elements. No essential difference was found between the deciduous and evergreen species examined. In ring-porous species (3), the first stage was marked by the appearance of irregularly distributed vessels, becoming lignified after 5–10 days; the other elements were differentiated centrifugally round these vessels. Hence the newly formed tissue was bounded by an undulating line until, after 1–2 weeks, a continuous zone was produced. Cambial activity started at the same time as flushing in (1), after leaf expansion in (2), and several days before flushing in (3). The differences observed are believed to be due to differences in the distribution of growth regulators.

811.5. Sapwood and Heartwood

See also Nos. 2341, 2497, 2540.

2272. JURÁŠEK, L. Působení teploty a vlhkosti dřeva na tvorbu thyl u buku. **[The influence of wood temperature and moisture content on the formation of tyloses in Beech.]** *Drev. Výskum* 3 (1), 1958 (5–13). 4 refs. [Cz.cz.russ.g.e.] P.R.

The parenchymatic cells die after ca. 30 min. exposure to temperatures of 55° C., but can withstand ca. 8 hr. and sometimes longer at 50°. The cells die at m.c.'s < 30%. Tyloses are formed only between 15 and 40° (most continuously at ca. 25°) and at m.c.'s > 50%.

2273. NEČESANÝ, V. Změna vitality parenchymatických buněk jako fysiologický základ tvorby jádra u buku. **[The change in vitality of parenchymatic cells as the physiological basis for the formation of heartwood in Beech.]** *Drev. Výskum* 3 (1), 1958 (15–26). 29 refs. [Cz.cz.russ.g.e.] P.R.

Vitality of the parenchyma cells of the wood rays was tested in 4 different ways, including their electric conductivity.

2274. MEIDEN, H. A. VAN DER. Kernhout bij populieren en zijn praktische betekenis. **[Heartwood of Poplars and its practical importance.]** *Korte Meded. Bosbouwproefsta., Wageningen* No. 32, 1958. pp. 6. [Du.e.]

Histological examination and physiological experiments on Poplars of the *Aigeiros* section showed that they contain true heartwood, even in young trees (e.g. 7 years old) where it is not coloured. Three types of heartwood can be distinguished: (1) normal, greenish or brownish grey; (2) dark brown, irregular in shape, sometimes extending to the outer annual rings and usually caused by wounds; (3) bluish-black, formed in 0·1% of the trees: this type is not caused by micro-organisms but is due to site factors and is found on poorly drained soils with accumulation of Fe compounds. For most uses of Poplar, the colour is of little importance, but the longer drying needed by the heartwood is a disadvantage.

811.7. Phloem; Bark

See also No. 1450.

2275. GARDINER, A. S. **Variation in bark characteristics in Birch.** *Scot. For.* 12 (4), 1958 (191–5 + 2 plates). 14 refs.

Shows the range of variation in the bark of *Betula verrucosa* and *B. pubescens*, and its possible relation to timber quality in mature trees. The various bark types are based on Lindquist's terminology [see *F.A.* 9 No. 1468].

812. Physical and Mechanical Properties

See also Nos. 1610, 2259.

2276. MOŽINA, I. O lesu črnega gabra (*Ostrya carpinifolia*). **[The wood of *O. carpinifolia*.]** *Zbornik za Kmetijstvo in Gozdarstvo, Fakulteta za Agronomijo, Gozdarstvo in Vetinarstvo, Ljubljana* No. 4, 1957. pp. 39. 24 refs. [Sloven.sloven.g.e.]

Tests of the mechanical and physical properties of 8 samples from each of 5 trees of *O. carpinifolia* from Slovenia showed it to have a high sp. gr. (oven-dry) averaging 0·793 ± 0·033, high strength properties and shrinkage, and a mean fibre saturation point of 30%. Data are tabulated. There was no clear correlation between ring width and sp. gr. A comparison with Beech wood from the same area showed that *O. carpinifolia* averaged 21·6% heavier, with strength properties 12·8–21·4% higher.

2277. CURRO, P. Características físicas del leño de *Eucalyptus globulus* Labill. **[Physical properties of the wood of *E. globulus*.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 228–200, 1957. pp. 15 + 7 gphs. 5 refs. [Span.span.]

From 18-year-old trees, in Lazio, Italy.

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

See also Nos. 2235, 2292, 2530.

2278. VALENTE, E., and PARDO, L. L. Fluorescencia de maderas argentinas. **[Fluorescence of Argentine woods.]** *Rev. Invest. for., B. Aires* 1 (4), 1957 (47–51). 5 refs. [Span.]

Presents the results of tests of the fluorescent properties of 63 species.

2279. Le comportement du bois au feu. Quand et comment le protéger contre l'incendie. **[The behaviour of timber when burning. When and how to protect it against fire.]** *Cah. Centre Tech. Bois* No. 14, 1958. pp. 29. [F.] P.R.

A revised and enlarged edition with numerous illustrations, dealing *inter alia* with the development, in France, of the relevant legislation, difficulties in the terminology of combustion, criteria and standard apparatus for testing, the behaviour of wood when burning, and methods of reducing fire risks.

2280. EMČENKO, M. P. O teploemkosti drevesiny. **[The specific heat of wood.]** *Derev. Prom.* 7 (5), 1958 (18–9). 8 refs. [Russ.] P.R.

In investigations on wood, use was made of G. M. Kondrat'ev's method for determining specific heat, in which the comminuted substance, placed in a small, hollow metal cylinder (microcalorimeter), cools in the air under natural convection conditions and its changes in temperature are measured at regular intervals. A formula is developed for finding the specific heat of the substance in kcal. Results show the specific heat of Scots Pine wood to be 0·38, of Spruce 0·34, of Birch 0·45, and of Birch bark 0·43 kcal./kg. degree.

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 2263, 2276, 2304, 2416, 2483–4, 2530, 2571, 2576, 2581, 2586, 2588.

2281. MILLER, M., and MAY, A. **A procedure measuring the volume of small wood samples.** *For. Prod. J.* 8 (8), 1958 (224–5).

The method, which measures the volume displacement in petroleum ether of samples previously saturated with that ether, was developed primarily for increment cores used in the assay of PCP-treated wood, and is claimed to be accurate to ± 0·01 ml. Tests were made on treated Douglas Fir, and Pines.

2282. BERSENEV, A. P., and FOKINA, A. G. Opyt ispol'zovanija radioaktivnyh izotopov dlja issledovanija drevesiny. **[An experiment on the use of radio-active isotopes for investigations on wood.]** *Derev. Prom.* 7 (8), 1958 (11–3). 2 refs. [Russ.] P.R.

Using Sr^{90} and Ru^{106}, investigations were made on the penetration of β-rays through samples of Scots Pine, Spruce, Birch, Oak, Beech and Larch of 1, 2, 4 and 8 mm. thickness. It was found that the denser woods allowed less penetration, and that penetrability decreased with increasing sample thickness, and increased with a reduction in wood moisture content. β-rays are considered to be more useful than γ-rays in wood technology, and can be employed to find the fibre saturation point, the m.c. of wood of known thickness and density, and the density of wood of known m.c. and thickness.

2283. RIJSDIJK, J. F. Het meten van vochtgehalten met elektrische meters. [**Measuring moisture content with electrical meters.**] *Repr.* from *Houtwereld, Netherlands* Nos. 21, 22, 1958. pp. [4]. [Du.]

Discusses and presents in graphs the results of studies at the Houtinstituut T.N.O. on the accuracy of moisture-meter readings. Readings for Sapele proved to have a very wide scatter and those for Beech, Spruce and Pine were all below actual values. The effects of wood temperature and distribution of moisture within the wood are discussed.

2284. KILPATRICK, C. S. **The distillation method of moisture determination.** *Forester, N. Ire.* 1 (3), 1958 (5–8).

The method described is more accurate than the electrical moisture meter and, though slower, takes only $\frac{1}{2}$ hr. to complete. At Baronscourt the Dean and Stark apparatus has been found to be most compact and to allow readings to be taken with speed and accuracy. Wood chips are boiled in xylene and both the xylene vapour and water vapour are driven off and rise into a water-cooled condenser whence they run down into the graduated cylinder, with the heavier water below. The volume of water is read, and as 1 c.c. = 1 g., its weight also is accurately known, so that no second weighing of the wood is necessary as in the oven-drying method. M.c. in % of dry weight of wood is then determined from the formula

$$\frac{M}{D} \times 100$$

where M = weight of water distilled and D = dry weight of wood.

2285. FILIPPOV, B. N. Bystryj metod opredelenija vlažnosti drevesiny. [**A rapid method of determining the moisture content of wood.**] *Gidrol. lesohim. Prom.* 10 (5), 1958 (25–6). 2 refs. [Russ.] P.R.

Ten grams of sawdust are heated by a 100-watt electric lamp, for 40 min. if the sample is from wet wood, and 25 min. if from dry wood, or until the sawdust temperature reaches 150–160° C. The sawdust is then weighed and the difference in weight expressed as a % of the original sawdust weight gives the % moisture content of the wood. A comparison determining the m.c. of 3 samples by this method and a control standard method, gave a deviation of only 2–6%. A scale of values is given showing the relationship of the m.c. to the drying time, as determined from laboratory experiments.

2286. KOLLMAN, F., and SCHNEIDER, A. Einrichtungen zur praxisnahen und wissenschaftlich exakten Messung von Sorptionseigenschaften von Holz- und Holzwerkstoffen. [**Apparatus for the routine and precision measuring of the sorption properties of wood and wood-based raw materials.**] *Holz Roh- u. Werkstoff* 16 (4), 1958 (177–22). 5 refs. [G.g.e.] P.R.

Describes and illustrates apparatus developed at the Institute of Wood Research and Wood Technology, Munich University. The 'routine' apparatus, combining features of the gravimetric equilibrium and direct vapour-pressure methods, permits the determination of sorption isotherms for wood in 5 days. The precision apparatus includes facilities for exact measurements of hysteresis. *From authors' summary.*

2287. **Equilibrium moisture content.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1956/57*, 1957 (88).

Eleven exposure sites have been established in Australia and New Guinea for a study to enable prediction of wood equilibrium moisture content (e.m.c.) from weather data. Measurements of the e.m.c. of wood in use showed a 4% seasonal range superimposed on a 5% elevation range (bearers to rafters) in housing components in the Melbourne area, but little variation in wharf decking or piles above water level, which remained at ca. 25%. Railway sleepers retained a core m.c. exceeding fibre saturation point irrespective of season, but surface m.c. ranged from 8 to 25%.

2288. OHNUMA, K., and SAITO, H. [**Some aspects of the influence of hot pressing on the shrinkage of thin wood.**] *Wood Ind., Tokyo* 13 (9), 1958 (21–5). 16 refs. [Jap.e.*e.*] P.R.

Thin laths 100 × 10 (in direction of grain) mm. of *Fagus crenata* and *Chamaecyparis obtusa* were hot-pressed green or at the fibre-saturation point. Graphs are presented showing: (1) the effect of pressure (0·3–26·0 kg./sq. cm.) on the shrinkage [deformation?] of the tangential and radial faces; (2) the effect of temperature (100–200° C.) on shrinkage; at various constant pressures; (3) the effect of specimen thickness (0·5–8·0 mm.) on shrinkage; (4) thickness recovery on release of pressure.

2289. NAKATO, K. [**On the cause of the anisotropic shrinkage and swelling of wood. IX. On the relationships between the microscopic structure and the anisotropic shrinkage in transverse section. (2).**] *J. Jap. Wood Res. Soc.* 4 (4), 1958 (134–41). 13 refs. [Jap.e.*e.*] P.R.

[Cf. *F.A.* 20 No. 974.] The investigations were made on *Cryptomeria japonica*, *Abies firma* and *Larix leptolepis*. Results, given in tables and graphs, indicated the principal cause of anistropic shrinkage in transverse section to be the cell-wall structure, particularly the deviations in fibril angle between the tangential and radial wall.

2290. KONING-VROLIJK, G. M. C. De verwerkingsmogelijkheden van doussié en afzelia (apa). [**The working properties of *Afzelia* spp.**] *Repr.* from *Houtwereld, Netherlands* May 10th, July 19th, 1958. pp. 3. [Du.]

Tests were made at the Houtinstituut T.N.O. on the seasoning and shrinkage of Doussié from the Cameroons and Apa from the Gold Coast. Some evidence was obtained that low shrinkage and swelling values are related to the presence of extractives. Recommendation on seasoning for use in different conditions of humidity are given. Two of the samples of Apa showed shrinkage values during seasoning similar to those of Doussié; the third sample showed considerably higher shrinkage in drying to equilibrium moisture content at lower relative air humidities (30 and 40%).

2291. MOROÑA, L. G. **Preliminary study on the effects of boiling on shrinkage of one-inch thick Apitong wood [*Dipterocarpus* spp.]** *Philipp. J. For.* 12 (1/2), 1956 (1957), (39–55). 5 refs.

Boiling wood in water increases its shrinkage; the longer the boiling, the greater the shrinkage. The rates of radial to tangential shrinkage of a boiled specimen remains the same as that of an unboiled one. *From author's summary.*

2292. **Sorption studies.** *Rep. For. Prod. Aust. 1957/1958*, 1958 (11).

[Cf. *F.A.* 18 No. 4545.] The sorptive capacities and heats of wetting of hemicelluloses of *Eucalyptus regnans* proved to be considerably greater than those of any other constituents. From the sorption measurements of all the constituents, allowing for probable changes during isolation, it was concluded that the sorption of water by dry wood may be considered as the sum of the amounts sorbed by its constituents. With isolated methanol and Klason lignins over a range of 0·6–0·9 relative water-vapour pressure, a maximum of 60 and 80% respectively of the water being adsorbed entered the lignin structure, but outside this range the fraction of adsorbed water contributing to swelling appeared to be smaller. In studies on the kinetics of water sorption by wood, the final equilibrium moisture content of wood exposed to a given relative water pressure during adsorption was greater when a larger vapour-pressure step was involved. Under the same conditions, the rate of approach to equilibrium was considerably greater when a larger vapour pressure step was used, being greatest with a step starting from the dry state. The size of the step is not the only factor determining this rate, since for approximately equal increments in vapour pressure the rate of approach to equilibrium decreased sharply as higher vapour pressures were reached.

2293. KUMAR, V. B. **Swelling studies in wood. Part 2.** *Norsk Skogind.* 12 (9), 1958 (337 . . . 345). 14 refs. [E.e.nor.] P.R.

The species and the methods used were the same as in the previous experiment [see *F.A.* 19 No. 928]. The swelling agents were formic, acetic, propionic and butyric acids and pyridine. A correlation was found between swelling and amount of liquid taken up under complete saturation. Swelling was proportional to oven-dry density in all the timbers except *Musanga smithii*, in which it was higher than would be expected from the density. Swelling was inversely proportional to the molecular weight of the liquid in the homologous series, but was greater for butyric than for propionic acid. Surface tension of the liquid was directly correlated with swelling. The effect of the dimensions of the test pieces was erratic. There was some evidence of an inverse relationship between strength properties of the species and swelling [cf. *F.A.* 20 No. 2304].

2294. SUOLAHTI, O., and WALLÉN, A. Der Einfluss der Nasslagerung auf das Wasseraufnahmevermögen des Kiefernsplintholzes. [**The effect of water storage on the water absorption capacity of Pine sapwood.**] *Holz Roh- u. Werkstoff* 16 (1), 1958 (8–17). 19 refs. [G.g.e.] P.R.

The importance of absorption of liquids in relation to preservation is briefly discussed. Preliminary experiments with specimens $5 \times 2{\cdot}5 \times 1{\cdot}5$ cm. soaked for $\frac{1}{2}$ or 24 hr. showed that there was little difference between amounts of water taken up radially or tangentially and that the separation of the blocks into two groups, representing good and bad absorption, was not affected by sealing the ends of the blocks. No clear relationship was found between absorption and wood structure (e.g. ring breadth, % of latewood). Samples from freshly felled Pine sapwood dried rapidly at high temperatures took up water less readily than those dried at lower temperatures, and air-dried wood took up decreasing amounts of water with increasing time of storage. Floated wood, or wood that had been stored wet for some time, took up water readily after drying; chemical tests showed that the resin did not account for this, but that the uptake of water increased with a decrease in pectin apparently due to decomposition by micro-organisms. The action of bacteria, *Trichoderma*, *Aspergillus*, *Coniophora cerebella*, and *Poria vaporaria* increased the amount of water taken up, at the same time reducing the pectin content. The same effect was obtained when wood was heated in a pectin-dissolving $(NH_4)_2C_2O_4$ solution at 35° C. or in an autoclave at 1 atm., and the effect in the former case was considerably increased by adding a pectin enzyme to the solution

2295. KÜBLER, H. Studien über die Holzfeuchtebewegung. [**Moisture movements in wood.**] *Holz Roh- u. Werkstoff* 15 (11), 1957 (453–68). 69 refs. [G.g.e.] P.R.

A critical review of the literature, including a discussion of the role of diffusion and capillary flow, the influence on conductivity of various factors, including heat, and the discrepancies between the moisture conductivity values and diffusion coefficients obtained by various researchers.

812.3. Density. Specific Gravity. Buoyancy

See also Nos. 2276, 2282, 2293, 2298, 2351–4, 2357–9 2485.

2296. TAMOLANG, F. N., and BALCITA, B. B. **The specific gravity of Balobo (*Diplodiscus paniculatus* Turcz.) from the Makiling National Park.** *For. Leaves, Philippines* 10 (2), 1957 (21–8). 8 refs

Tests were made on 4 trees. Average sp. gr. at 70·9% moisture content ranged from 0·568 to 0·714, with a mean value for all samples of 0·663 ± 0·002. Sp. gr. was found to decrease from butt to top of the log and from the bark to the pith; it varied significantly between individual trees. The densest wood occurred near the bark in trees with a lean to N. or S., and midway between bark and pith in those with a lean towards E. or W. Lack of replication makes it impossible to draw conclusions from this last finding, but it is considered worth further investigation.

812.7. Strength Properties

See also Nos. 2276, 2359, 2375–6, 2378, 2402, 2419–21, 2423–5, 2428, 2431–2, 2485, 2498, 2539, 2581–2.

2297. GURSAHANEY, H. J., and GANESAN, G. **Strength properties of Himalayan Spruce for aircraft and glider construction.** *Journal of the Aeronautical Society of India* 10 (2), 1958 (23–7). 5 refs. From *abstr.* in *Index aeronauticus* 14 (10), 1958 (104–5). P.R.

Strength properties of Sitka Spruce conforming to *Specification D.T.D.* 36*B* were used as a reference standard. On the basis of the test results it was found that the mean values of end-grain compression strength, Izod strength and density of Himalayan Spruce [*Picea smithiana* and *P. spinulosa*?] compare favourably with the corresponding mean values for Sitka Spruce, and that the indigenous species are suitable for use in the construction of gliders and light aircraft.

2298. TAKAHASHI, Y., and KUROGI, S. **[Studies on the mechanical properties of wood of *Libocedrus formosana* Florin grown in Kagoshima.]** *Bulletin, Faculty of Agriculture, Kagoshima University* No. 4, 1955 (124–6). 12 refs. [Jap.jap.e.]

Average values were: density 0·660 g./c.c.; compression || 519·4 kg./sq. cm.; absorption energy 0·471 kg. m./sq. cm. The compression strength was greater than that of wood grown in Formosa. *From authors' summary.*

2299. SEKHAR, A. C., and RAWAT, B. S. Der Einfluss von Grösse, Form und Einkerbung auf Holzprüfkörper. **[The influence of size, shape and notches in test specimens of wood.]** *Holz Roh- u. Werkstoff* 16 (3), 1958 (94–6). 9 refs. [G.g.e.] P.R.

Shape of the specimen was found to have considerable effect on the modulus of elasticity, crushing strength and impact bending strength. The presence of notches caused a decrease in toughness and other properties, but a detailed explanation of the effect of notches is not yet possible.

2300. OŠEROVIČ, L. I. Ispytanie drevesiny na rastjaženie poperek volokon. **[Testing wood in tension across the grain.]** *Zavodskaja Laboratorija, Moskva* 21 (11), 1955 (1374–7). 6 refs. [Russ.] N.L.L.

Details a new shape for specimens for tension tests across the grain tangentially and radially, and the results of tests on Scots Pine, Birch and Oak to determine influence of the speed of loading and wood moisture content on strengths, the plastic deformation of the sample, and the modulus of elasticity.

2301. PAMFILOV, V. V. Metod učeta raboty i deformacii obrazca drevesiny pri udarnyh ispytanijah. **[A method of calculating the [specific] work and deformation of a wood sample in impact tests.]** *Zavodskaja Laboratorija, Moskva* 22 (3), 1956 (333–4). [Russ.] N.L.L.

Describes a prototype device that can be fitted to impact testing machines for determining the plastic flow of wood samples. It involves basically a photo-element, and recording is by loop-oscillograph.

2302. YLINEN, A. Zur Theorie der Dauerstandfestigkeit des Holzes. **[Theoretical observations on strength of wood under prolonged loading.]** *Holz Roh- u. Werkstoff* 15 (5), 1957 (213–5). 6 refs. [G.g.e.] P.R.

Discusses the application of Maxwell's relaxation theory and St. Venant's rupture hypothesis to the development of stresses in wood under long-term loading, and presents a formula relating strength under prolonged loading to values obtained by rapid bending tests, by reference to loading time, with relaxation time and the moduli of elasticity at short-time and infinite-time loads, as constants. *From author's summary.*

2303. **Rheological studies.** *Rep. For. Prod. Aust. 1957/1958*, 1958 (12–3).

Automatic equipment (illustrated) has been developed for studying the effect of stress on rate of creep, of strain on rate of relaxation, and of mechanical conditioning on creep. In work on stress in the range 50–85% of the total values, creep rate increased very little up to ca. 65%, but at 65–70% it increased rapidly with increase in stress, particularly when loading was continued for 3 hr. or more. Mechanical conditioning, reducing but not eliminating both the recoverable and irrecoverable parts of creep, was found to occur quite markedly in wood at stresses > 65%; recovery rate is much slower than creep rate, and a substantial increase in recovery may take place over very much longer times than those of the experiment, thus reducing the estimate of remaining irrecoverable creep. [Cf. *F.A.* 16 Nos. 4514–5.]

2304. KUMAR, V. B. Der Einfluss organischer Flüssigkeiten auf mechanische Eigenschaften des Holzes. **[Effect of some organic liquids on the mechanical properties of wood.]** *Holz Roh- u. Werkstoff* 15 (10), 1957 (423–32). 20 refs. [G.g.e.] P.R.

These further studies cover the soaking of the first 4 species mentioned in *F.A.* 17 No. 3234 in all the liquids listed there, and also in pyridine and glycerine, and the effect of this on their compression ||, [static] bending strength, and modulus of elasticity. In all cases the mechanical properties of the woods corresponded to their oven-dry densities, but were not always proportional to their swelling. It was possible to find a statistical connexion between the mechanical properties of the woods on the one hand and the dielectric constants of the liquids and the volume swelling of the woods on other. This connexion was valid for most of the the liquids, and agreed well with values fixed by earlier authors. [Cf. *F.A.* 20 No. 2293.]

2305. POPOVIĆ, V., and STOŠIĆ, D. Izbor oblovine za izradu greda maksimalne nosivosti. [**Choice of round wood for beams of maximum load-bearing capacity.**] *Šumarstvo* 11 (3/4), 1958 (155–60). 1 ref. [Serb.e.f.]

Shows, using mathematical formulae, that beams from logs with elliptical cross-section have a higher load-bearing capacity than those from logs with round cross-sections, if the area of these cross-sections at the smaller end of the log are the same.

2306. THUNELL, B. Über den Einfluss der Baumkante auf die Biegefestigkeit von Bauholz. [**The influence of round edges [wane] on the bending strength of timber.**] *Holz Roh- u. Werkstoff* 15 (7), 1957 (297–301). 2 refs. [G.g.e.] P.R.

Describes computations, and tests with Pine poles of 5–7 in. top diam. from which sample beams of various lengths and cross-sections from round to square-sawn, had been cut, indicating that a small amount of wane, such as is normal, has little effect on the calculated moment of resistance, and that for greater amounts of wane, and in the extreme case, for round wood, the loss of bending strength due to reduced cross-section is largely compensated for by the greater strength of the natural grown surface as compared with a sawn surface.

2307. NEDBAL, F. Der Vergleich zwischen der Höppler- und Brinellhärte des Holzes. [**Comparison of the Höppler and Brinell hardness of wood.**] *Holz Roh- u. Werkstoff* 15 (5), 1957 (215–20). 3 refs. [G.g.e.] P.R.

Discusses tests on Spruce, Pine and Beech in relation to load, fibre orientation, density etc. With Höppler's method [cf. *F.A.* 17 No. 819] radial and tangential surfaces give higher values, and with Brinell's, end-grain surfaces. The Höppler method is thought capable of finer distinctions.

2308. POST, P. W., and NEARN, W. T. **A note on the effect of slope of grain on the apparent moduli of rupture and elasticity of Mahogany plywood.** *Res. Pap. Pa. St. For. Sch.* No. 27, 1958. pp. 5. 4 refs.

The material tested was 3-ply beams fabricated from $\frac{1}{32}$-in. African or Honduras Mahogany [not further specified]. The results indicate that if breakage at the critical radius of curvature is limited to 0·2 (fraction of specimens that broke), grain slope that is detrimental to strength will be eliminated.

2309. NISKANEN, E. **On the distribution of shear stress in a glued single shear test specimen of Finnish Birch timber.** *Julk., Valt. tekn. Tutkimusl.* No. 36, 1957. pp. 19. 6 refs. [E.e.] P.R. [Cf. *F.A.* 17 No. 2035.]

2310. MAMADA, S., KAKEGAWA, H., and YAMANA, S. [**Puncture test in plywood and hardboard.**] *Wood Ind., Tokyo* 13 (6), 1958 (22–7). 3 refs. [Jap.e.*e.*] P.R.

Gives the results of puncture tests on plywood and hardboard in which a circular weight (radius 0·5–5 cm.; weight 0·7 and 1·5 kg.) was dropped in a special apparatus, either repeatedly from the same height, or from heights which could be increased in 5-cm. steps. Graphs show the relation between (1) the number of strikes and height of drop, (2) puncture energy and board thickness, (3) puncture energy and radius of weight, and (4) puncture energy and board absorption of water; the types of failure are illustrated. *From authors' summary.*

812.8. Workability. Working Properties

2311. **Standard woodworking tests (Project 9).** *Tech. Note Util. Div. For. Dep. Tanganyika* No. 7, 1958. pp. 12.

Covers procedure, machines used and their characteristics, preparation of test material for assessing, in machine and hand working under standard commercial conditions, the quality and accuracy of finish, resistance to cutting and feeding, and effect on cutting edges. The tests include rip-, band-, cross-cut and dimension sawing, planing, moulding, mortising, boring, recessing and routing, turning, sanding and scraping, staining, polishing and nailing.

2312. FLAMWELL, C. T. **The woodworking properties of *Brachystegia spiciformis*.** *Tech. Note Util. Div. For. Dep. Tanganyika* No. 10, [1958]. pp. 4.

[Cf. preceding abstract.] Specifies the best saws, settings etc. Satisfactory moulding, routing and good boring are difficult to attain.

2313. FLAMWELL, C. T. **The woodworking properties of *Baikiaea eminii*.** *Tech. Note Util. Div. For. Dep. Tanganyika* No. 12, 1958. pp. 3.

Specifies the best saws, settings etc. One-inch-diam. boring showed 10% bottom breaks. Nails have to be set well in from edge or end, some pieces being unnailable.

2314. FLAMWELL, C. T. **The woodworking properties of *Cassipourea elliottii* (Pillarwood).** *Tech. Note Util. Div. For. Dep. Tanganyika* No. 13, 1958. pp. 3.

Specifies the best saws, settings etc. The timber behaved satisfactorily to well in all operations. It is not difficult to nail but should be bored for nails of $\geqslant$ 4 in.

813. Wood Chemistry

See also Nos. 1423, 2236, 2554, 2558, 2560, 2565, 2570.

2315. ERDEY, L. **Testing of matter by derivative thermogravimetry.** *Chemické Zvesti, Bratislava* 12, 1958 (352–65). [Cz.? g.] P.R. From *abstr.* in *Chem. Abstr.* 52 (19), 1958 (16024). P.R.

Methods are reviewed and examples given of their use in determining the composition of a number of substances including Beech wood.

2316. KÜRSCHNER, K. Einige kritische Erwägungen zur Analyse von Hölzern. [**Some critical reflections on the analysis of woods.**] *Holz Roh- u. Werkstoff* 16 (8), 1958 (288–97). 50 refs. [G.g.e.] P.R.

Discusses the Kürschner-Hoffer method of quantitative cellulose determination, developed in 1929, proposes some improvements, and describes a

new method for lignin determination in which the aromatic component of the lignified membranes is converted into nitrolignin by the action of alcoholic HNO_3. Some results for different wood species are presented and discussed.

2317. VYAS, G. M. **Chemical analysis of Bamboo tissues.** In *Cellulose Research: a symposium.* Council of Scientific and Industrial Research, New Delhi. 1958. pp. 83–91. 8 refs. P.R.

The fibres in the lowest internodes of the culm of *Dendrocalamus strictus* contained 11·9% more cellulose, 1·4% more lignin and 14·6% more α-cellulose, but fewer pentosans, water- and alkali-soluble materials and extractives, than the parenchyma cells, and more lignin and cellulose than the fibres, of the highest internodes. The epidermal cells contained large amounts of extractives and about 28% of ash, mostly siliceous. Nodal tissues contained more solubles and a little more ash than the internodal tissues. Some figures for *Bambusa nutans* are included for comparison.

2318. VALENTE, H. M. Estudio químico de la madera de palma. [**Chemical study of wood of *Copernicia alba***.] *Rev. Invest. for., B. Aires* 1 (4), 1957 (53–61). 3 refs. [Span.]

Presents results of analyses of the wood in its 3 distinguishable stages of maturity ('palma negra', 'palma colorada' and 'palma blanca'), the distribution of extractives in these 3 stages, and a comparison of the constituents of the wood with those of the most common Argentinian hardwoods and softwoods. In its content of lignin and CH_3COOH, *C. alba* approaches conifers (ca. 27–33% for lignin and 1·3–2% for CH_3COOH); as regards cellulose and pentosans it may be compared to hardwoods (ca. 40–45% for cellulose and up to 17–21% for pentosans).

2319. PEARL, I. A., BEYER, D. L., and JOHNSON, B. **Alkaline hydrolysis of representative hardwoods. II.** *Tappi* 41 (5), 1958 (255–6). 5 refs. P.R.

A previously reported study [see *F.A.* 19 No. 947] on the alkaline hydrolysis of 34 representative hardwoods was continued with 12 new woods, and the *p*-hydroxybenzaldehyde and *p*-coumaric acid yields of all 46 species were determined. Earlier vanillin yields and syringaldehyde/vanillin ratios were corrected for all species yielding *p*-hydroxybenzaldehyde. *Catalpa speciosa* was the only wood outside the Salicaceae yielding *p*-hydroxybenzoic acid on alkaline hydrolysis. *From authors' summary.*

2320. STANEK, D. A. **A study of the low-molecular weight phenols formed upon the hydrolysis of Aspenwood.** *Tappi* 41 (10), 1958 (601–9). 29 refs. P.R.

Seven crystalline aromatic compounds were isolated from the ether-soluble portion of the hydrolysis liquors obtained when extracts of *Populus tremuloides* were treated with water at 170° C. Evidence was obtained that these 7 compounds might have been derived from *P. tremuloides* lignin.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

See also Nos. 2260–1, 2292, 2479, 2491–2, 2569.

2321. ISHIKAWA, H., *et al.* **Lignin and lignification. VII. The formation of lignin in the young plant. 3.** *Journal of the Agricultural Chemical Society of Japan, Tokyo* 31, 1957 (375–9). [Jap.?] From *abstr.* in *Chem. Abstr.* 52 (18), 1958 (15657–8). P.R.

[Cf. *F.A.* 19 No. 956.] Lignin and other components were determined in young plants of *Phaseolus mungo* and *Pinus densiflora* during growth in water culture, and the effects of some organic compounds on lignin formation were studied. Shikimic acid, phenylalanine, tyrosine, phenylpyruvic acid, *p*-hydroxyphenylpyruvic acid, ferulic acid, coniferin and syringin acted as lignin precursors, and their addition to the medium promoted lignin formation.

2322. ISHIKAWA, H., and TAKAICHI, K. **Lignin and lignification. VIII. The formation of lignin in the young plant. 4.** *Journal of the Agricultural Chemical Society of Japan, Tokyo* 31, 1957 (380–3). [Jap.?] From *abstr.* in *Chem. Abstr.* 52 (18), 1958 (15658). P.R.

The presence of lignin precursors in extracts of leaves of *Robinia pseudoacacia* and seedlings of *Phaseolus mungo* was determined. Shikimic acid phosphate, sedoheptulose phosphate, coniferin, syringin, coniferyl alcohol, shikimic acid, phenylalanine and tyrosine were found in the extracts. The effect of incubating the extracts with lignin precursors is discussed.

2323. HÄRTEL, O., WACEK, A.V., and MERALLA, S. Über die Wirkung des Zusatzes von Coniferin, Propioguajakon-d-Glukosid und anderen Stoffen auf Gewebekulturen *in vitro.* [**The effect of adding coniferin, propioguaiacone-*d*-glucoside and other substances to tissue cultures *in vitro***.] *Holzforschung, Berlin* 12 (2), 1958 (33–6). 4 refs. [G.g.e.] P.R.

Normal non-lignified tissue of Spruce bark cultured on a medium containing coniferin showed a phloroglucinol-HCl reaction, indicating lignification, and a greatly increased OCH_3 content. The edges of sliced potatoes gave a similar reaction when grown on a similar medium. Spruce bark grown on a culture containing eugenol also showed a positive reaction, but neither thymol nor propioguaiacone-*d*-glucoside had this effect. [Cf. *F.A.* 16 No. 2190.]

2324. GAUTHERET, R. J., WACEK, A. v., and MERALLA, S. Über den Einfluss des Zusatzes von Coniferin bzw. Propioguajakon-*d*-Glucosid zum Nährboden verschiedener Gewebekulturen *in vitro.* [**The effect of adding coniferin or propioguaiacone-*d*-glucoside to the media of various tissue cultures grown *in vitro***.] *Holzforschung, Berlin* 12 (4), 1958 (97–9). 8 refs. [G.g.e.] P.R.

[Cf. *F.A.* 16 No. 2190.] Tissues used were those of *Scorzonera hispanica* and *Vitis vinifera* (both from tumours), *Crataegus monogyna, Sequoia gigantea* (from normal tissue and from tumours) and *Helianthus tuberosus.* All these tissues gave colour reactions to phloroglucinol in varying degrees when

grown on media containing coniferin, but not as a rule on control media. Cultures grown on media containing propioguaiacone proved similar to those on control media.

2325. **Chemistry of reaction wood**. *Rep. Commonw. sci. industr. Res. Organ. Aust. 1956/57*, 1957 (85).

[Cf. *F.A.* 18 No. 4568.] Tension-wood lignin from an immature Eucalypt showed the spectral characteristics of lignin from normal mature wood. The lignin from wood opposite tension wood had a lower ratio of syringyl to guaiacyl nuclei than normal. Compression-wood lignin from *Pinus radiata* had a lower methoxyl content than normal, and the presence of methoxyl-free nuclei was indicated by the identification of *p*-hydroxybenzaldehyde in the oxidation products. The compression wood of *P. radiata* and tension wood of *E. goniocalyx* both contain much greater quantities of galactose than the normal woods.

2326. BLAND, D. E.; SCHWERIN, G. **The chemistry of reaction wood. Part I. The lignins of *Eucalyptus goniocalyx* and *Pinus radiata*. Part II. The polysaccharides of *Eucalyptus goniocalyx* and *Pinus radiata***. *Reprs.* from *Holzforschung*, *Berlin* 12 (2), 1958 (36–48). 50 refs. [E.e.g.] (*Repr. Div. For. Prod. Aust.* Nos. 354, 355.)

(I) Specimens of tension, 'opposite' and 'side' wood zones from 4 immature trees of *E. goniocalyx* and from *E. regnans*, and of compression, opposite, inner-sapwood, heartwood and side-wood zones of one 20-year-old *P. radiata*, were examined; the various zones are shown diagrammatically in cross-sections of the stem. Ultra-violet absorption spectra of tension-wood lignins of the Eucalypts had the maximum displaced towards the shorter wavelengths and a shallower minimum; similar differences were found between lignins of mature and immature wood [cf. *F.A.* 18 No. 3319]. No differences in ultra-violet absorption spectra were found between lignins from different zones of *P. radiata*. The basic chemical differences in the Eucalypt lignins appeared to be a lower ratio of syringyl to guaiacyl units in opposite wood and a larger number of coniferaldehyde-type side chains in the tension wood, and in the *P. radiata* lignins the replacement of some guaiacyl units by *p*-hydroxybenzyl units in compression wood. (II) The samples described above were used throughout. Water-soluble non-resistant polysaccharides of tension wood were liberated by methanol at 150° C. much more readily from tension wood than from other zones of *E. goniocalyx*, and the lignin of tension wood was more resistant to methanol than that of other zones. With *E. goniocalyx* tension wood about $\frac{1}{4}$, and with *P. radiata* compression wood about $\frac{1}{2}$, of the galactose remained in the α-cellulose. Non-cellulosic polysaccharides of normal woods appear to contain little or no galactose, whereas those of reaction wood contain large quantities.

2327. BLAND, D. E. **The spectra of reaction wood lignins in relation to wood maturity**. *Holzforschung*, *Berlin* 12 (4), 1958 (115–6). 4 refs. [E.e.g.] P.R.

Lignins from tension wood of two Eucalypts [*E. regnans* and *E. goniocalyx*] were resolved chromatographically and the ultra-violet absorption spectra of two fractions compared with the corresponding ones from other wood zones. The lignin from tension wood showed no well defined absorption minimum and in this respect shows some similarity to lignin from the outermost heartwood of mature trees. The $\triangle D$ curves of all lignins were similar; it therefore appears that the difference lies in the non-phenolic units. Lignins from the sapwood, heartwood and compression wood of *Pinus radiata* could not be distinguished by their ultra-violet absorption curves. *From author's summary.*

2328. NELSON, R., and SCHUERCH, C. **Factors influencing removal of pentosan from Birch wood: evidence of the lignin-carbohydrate bond**. *Journal of Polymer Science*, *Easton*, *Pa.* 22 (102), 1956 (435–48). 36 refs. [E.e.f.g.] O.R.S.

Particle size, alkali concentration and temperature were the factors studied in extracting pentosans from wood meal of *Betula papyrifera*. The amount of pentosan extracted increased with decreasing particle size. The optimum NaOH concentrations at 0, 20, 40, 60 and 80° C. are 2, 4, 7, 10 and 12%. Pentosan is made more accessible by raising the alkali concentration to these levels, but beyond them the amounts of accessible pentosan decrease. The decrease in extractability has the same concentration- and temperature-dependence as the increase in cellulose swelling in the same conditions; pentosan removal is inhibited by excessive swelling restricted within the rigid lignin and fibre structure, and similar but less marked inhibition occurs even after lignin removal. The factors that inhibit the removal of pentosan are physical rather than chemical, and there is no support for the concept of a lignin-carbohydrate bond.

2329. ČOČIEVA, M. M., and NIKITIN, N. I. Izučenie himičeskih svojstv dioksanlignina duba i nekotoryh hvojnyh porod. [**A study of the chemical properties of dioxane lignin from Oak and some conifers.**] *Ž. prikl. Him.* 30 (12), 1957 (1820–7). 13 refs. [Russ.russ.] L.S.

Gives the chemical composition of dioxane lignin of *Quercus fontinalis*, *Picea jezoensis*, *Abies nephrolepis* and *A. sachalinensis*, and shows the influence of different amounts of moisture on dioxane-lignin yields during extraction.

2330. HOSSAIN, S. **Action of dimethyl sulphoxide on wood and sulphite pulps**. *Pulp Paper Mag. Can.* 59 (8), 1958 (127–30). 13 refs.

This relatively inexpensive solvent, recently placed on the market, had, in the presence of small amounts of mineral acid, a powerful delignifying action on high-lignin Spruce sulphite pulps and Black Spruce chips. The dissolved ligneous material was easily precipitated in near-quantitative amounts on dilution with water, and was purified by dissolving in dioxane and re-precipitating in ether.

2331. ARLT, H. G., JR., and SCHUERCH, C. **Evidence of branching in ethanol [Spruce] lignins**. *Tappi* 41 (9), 1958 (481–3). 19 refs. P.R.

2332. **Lignin and related compounds.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1956/57*, 1957 (85).

Analysis of methanol lignin from *Eucalyptus regnans* has shown that, apart from its high methoxy content, its elementary composition is similar to that which has been deduced by various methods for the protolignin of Spruce. Springyl alcohol has been synthesized, and its absorption spectrum determined and compared with that of methanol lignin. The two substances have coinciding maxima and are in agreement with the conception that most of the phenolic groups of the lignin are syringyl alcohol groups. A lignin-like material separated by counter-current distribution during the purification of methanol lignin was found to give the usual lignin oxidation products, but the ultra-violet and infra-red absorption bands were poorly defined and an extra infra-red band was present. The material is therefore considered to be a degraded lignin.

2333. BLAND, D. E. **Qualitative paper chromatographic analysis of methanol lignin from *Eucalyptus regnans*.** *Repr.* from *Holzforschung, Berlin* 12 (1), 1958 (19–23). 15 refs. [E.e.g.]

Three lignin substances, one of them apparently a degraded lignin, could be recognized by their ultra-violet absorption spectra, in two-dimensional chromatography. Vanillin, syringaldehyde, sinapaldehyde and other substances were also present. The methanol lignin thus appears to be a group of lignin substances which has absorbed various degradation products.

2334. LEWIN, M., and EPSTEIN, J. A. **Studies on the nitration of *Eucalyptus rostrata* and *Pinus halepensis*.** *Tappi* 41 (5), 1958 (240–5). 17 refs. P.R.

Samples of the two species were nitrated with a mixture containing 64% HNO_3, 26% H_3PO_4 and 10% P_2O_5, for periods of 2 to 72 hr., and the products isolated and examined. Fractions obtained were: *S*, solids obtained by diluting the spent acids; *M*, solids obtained from methanol washings; *A*, the crude nitrate, which was further divided into A_1, the acetone-soluble fraction precipitated by water; A_2, the acetone-insoluble fraction; and A_3, the fraction soluble in acetone and water. None of the fractions was homogeneous, but *S* was mostly nitrolignin, *M* nitrolignin and nitrated hemicellulose, A_1 nitrated α-cellulose, and A_2 and A_3 nitrated hemicellulose. These findings were supported by the results of separate nitration of the wood components isolated by standard methods. Only 70% of the true α-cellulose was obtained as fraction A_1 from *E. rostrata*, and 90% from *P. halepensis*. The yield of fraction A_1 increased and of A_2 decreased with time of nitration, possibly because of the existence of a bond between the hemicellulose and the α-cellulose fraction.

2335. ELIAS, W. E., and HAYWARD, L. D. **The nitration of wood and related substances with gaseous dinitrogen pentoxide.** *Tappi* 41 (5), 1958 (246–50). 60 refs. P.R.

Model compounds, isolated wood components (holocellulose and lignin from Western Red Cedar heartwood and xylan from Beech), cotton cellulose and wood meal from Western Red Cedar heartwood were nitrated. Results are tabulated. During the nitration, the isolated lignin and the protolignin component of the whole wood took up O not included in nitro groups, and about 40% of the OCH_3 groups were removed from the protolignin. Preliminary results indicated that the nitrated wood could be partially fractionated by successive extractions with acetone and methanol.

2336. GARDON, J. L., and LEOPOLD, B. **Characterization of lignin oxidation products by the variation of Rf values with pH.** *Pulp Paper Mag. Can.* 59 (8), 1958 (148–54). 9 refs.

The method, illustrated by the identification of the products of the nitrobenzene oxidation of Birch wood and of a hardwood/softwood lignin sulphate, improves the chromatographic characterization of these products by using instead of one Rf value for each compound, a series of them, determined at different pH values with the aid of buffered papers, from which Rf/pH curves, characteristic for each compound are drawn. The best developers found were *n*-butanol and di-*n*-butyl ether. Further work with a different developer is required for the unequivocal identification of propriovanillone and propriosyringone, substances not hitherto reported in these products.

2337. TIMELL, T. E. **Some properties of four Canadian species of wood.** *Pulp Paper Mag. Can.* 59 (8), 1958 (139–40). 16 refs.

Extends the previous study on the composition and properties of the cellulose component of 10 Canadian species [see *F.A.* 18 Nos. 3326–7] to *Betula lutea*, *Ulmus americana*, *Acer saccharum*, and *Pinus strobus*, using essentially the same methods.

2338. GILLHAM, J. K., and TIMELL, T. E. **The polysaccharides of White Birch (*Betula papyrifera*). Part 7. Carbohydrates associated with the alpha-cellulose component.** *Svensk PappTidn.* 61 (17), 1958 (540–4). 36 refs. [E.e.sw.g.] P.R. [Cf. *F.A.* 19 No. 3438.]

2339. BERNARDIN, L. J. **The nature of the polysaccharide hydrolysis in Black Gumwood [*Nyssa sylvatica*] treated with water at 160° C.** *Tappi* 41 (9), 1958 (491–9). 44 refs. P.R.

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also Nos. 1424, 2234, 2263, 2270, 2294.

2340. MALEVSKAJA, S. S. Smola v drevesine eli. [**Resin in Spruce wood.**] *Ž. prikl. Him.* 30 (6), 1957 (903–10). 4 refs. [Russ.russ.] L.S.

Studies in the chemical composition of oxidized resin acids showed that after exposure to air, O atoms entered the resin-acid molecules.

2341. BREWERTON, H. V. ***Podocarpus spicatus* heartwood extractives.** *N.Z. J. Sci.* 1 (2), 1958 (220–3). P.R.

Four major compounds, all phenols, were isolated. Matairesinol, totarol, ferruginol and podocarpic acid were not found; the absence of the last three

confirms that the heartwood extractives are chemically unlike those of other *Podocarpus* spp. The high yield of phenolic extractives permits the distinction of heartwood and sapwood, by a simple staining test using 5% aqueous $FeCl_3$.

2342. HANZAWA, M., and SASAYA, T. **[Studies on constituents of the heartwood. I. A new phenolic constituent obtained from the heartwood of *Salix hultenii* var. *angustifolia*. II. Analysis of the heartwood extracts of *S. hultenii* var. *angustifolia* by the paper chromatographic procedure.]** *J. Jap. Wood Res. Soc.* 4 (4), 1958 (125–30). 11 refs. [Jap.e.] P.R.

A new flavononal-type compound ($C_{16}H_{14}O_{17}$) was obtained.

2343. RUDMAN, P., and COSTA, E. W. B. DA. **The causes of natural durability in timber. II. The role of toxic extractives in the resistance of Silvertop Ash (*Eucalyptus sieberiana* F. Muell.) to decay.** *Div. For. Prod. technol. Pap. For. Prod. Aust.* No. 1, 1958. pp. 8. P.R.

Successive extractions of the sawdust were made with ether, methanol, water, and alkali, the decay resistance of the sawdust being measured before and after each extraction; the extracts were incorporated into non-durable sawdust of *E. regnans*, which was then tested for decay resistance. The methanol extract only was significantly toxic to all 4 test fungi when so incorporated, but proved less so than the methanol extract of *E. microcorys* [see *F.A.* 19 No. 4804]. Only the methanol stage of the extraction procedure caused a consistent loss of decay resistance in *E. sieberiana*. Differences in original decay resistance among the trees included in the study were demonstrated and correlated with their respective contents of methanol-soluble extractives.

2344. COSTA, E. W. B. DA, RUDMAN, P., and GAY, F. J. **Investigations on the durability of *Tectona grandis*.** *Emp. For. Rev.* 37 (3), 1958 (291–8). 5 refs.

Laboratory tests were made of resistance to decay and termite attack, and extractive content of 18 natural and plantation-grown Teak trees 7–270 years old and from different countries. Resistance of sawdust and blocks from the heartwood to decay by *Coniophora cerebella* and *Trametes lilacino-gilva* varied widely for different trees, and there was no reliable correlation with origin, age, size or rate of growth. There was some indication of a correlation between decay resistance and amount of material removed by methanol extraction. Heartwood (h.w.) resistance to attack by *Coptotermes lacteus* and *Nasutitermes exitiosus* also varied widely, although a positive correlation emerged of termite resistance with age of tree and extractive content. Resistance to decay and termite attack was less in the centre of some trees than in the highly durable outer h.w., but was greater than that of *Eucalyptus regnans* h.w. used as a control. Teak sapwood samples were less resistant than the h.w., but much more resistant than *E. regnans* h.w. It is concluded that some Teak trees commence to form durable h.w. at a very early age, while others continue to produce non-durable h.w. for many years. Further investigations are being made of reasons for this difference, as well as studies of the nature and toxicity of extractive materials in Teak. *From authors' summary.*

2345. SANDERMANN, W., and DIETRICHS, H. H. Untersuchungen über termitenresistente Hölzer. **[Investigations on termite-proof wood species.]** *Holz Roh- u. Werkstoff* 15 (7), 1957 (281–97). 63 refs. [G.g.e.] P.R.

Chemical analyses, including chromatographs on paperboard, were made of 25 tropical species, using solid wood, chips, and extracts, chiefly with *Reticulitermes lucifugus* as test species. A further 7 resistant species were found. The most lethal substance in isolation was lapachonone.

2346. SANDERMANN, W., and DIETRICHS, H. H. **Investigations on termite-proof wood species.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3679, 1957. pp. 40 + 7 photos., 8 dgms., 6 gphs. 63 refs. Transl. by E. Feigl from *Holz Roh- u. Werkstoff* 15 (7), 1957 (281–97). [See preceding abstract.] Limited distribution.

2347. SANDERMANN, W., and DIETRICHS, H. H. **'Foreign substances'—cause of the specific nature of timbers: results of paper chromatographic investigations.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3985, 1958. pp. 8 + 8 dgms., 3 photos. 7 refs. Transl. by J. Hardy from *Umschau, Frankfurt am Main* 57 (7), 1957 (197–200). [See *F.A.* 18 No. 4590.] Limited distribution.

813.5. Reaction with Metals

2348. KOLJO, B. Untersuchungen über die Holzverfärbung durch Eisen. **[Staining of wood by [compounds of] iron.]** *Holz Roh- u. Werkstoff* 15 (12), 1957 (496–9). 3 refs. [G.e.] P.R.

Immersion in 1·0% $FeCl_3$ solution caused darkening in veneer samples, as measured photometrically, in the following rising order of intensity: Beech, Spruce, Pine sapwood, Birch, Pine heartwood and Oak. Subsequent heating to 100° C. intensified the effect. Solutions of 0·01 and 0·1% generally caused no marked staining.

814. Natural Durability. Old Wood. Fossilized Wood

See also Nos. 2343–7, 2497, 2504.

2349. TILLMANNS, H. J. Die natürliche Dauerhaftigkeit einiger Kernhölzer in Beziehung zur Lage im Stamm. **[Natural durability of some heartwoods in relation to their position in the stem.]** Thesis, Forstliche Fakultät, Universität Göttingen. 1957. pp. 101. 31 refs. [G.g.] P.R.

Blocks, 5·0 × 2·5 × 1·5 cm. of heartwood (h.w.) and sapwood (s.w.) from different positions in the stem of Pine, and h.w. only from European and Japanese Larch, *Quercus robur* and *Q. sessiliflora*, and Beech, were exposed to attack by *Poria vaporaria* (Pine), *Coniophora cerebella* (Pine, Larch, Oak and Beech), *Daedalea quercina* (Oak), or *Polyporus*

versicolor or *P. adustus* (Beech). Pine s.w. showed little variation in durability with position; h.w. durability increased towards the pith in the butt, but towards the sapwood higher up the tree, and generally decreased with increasing height. No difference was found in the durability of European and Japanese Larch; it increased towards the outer h.w. throughout the tree in European Larch and in the butt of Japanese Larch (other material was not available), and in the outer h.w. of both species (sufficient inner h.w. material was not available) it decreased with increasing height. Durability of Oak h.w. decreased towards the pith in the butt and usually throughout the tree; in *Q. robur* and usually in *Q. sessiliflora* it increased with increasing height. No relationship could be found between annual ring width and durability. Seasoning at 103° C. slightly reduced the durability of Oak h.w. but not that of Pine s.w. (other material was air dried only). No systematic variation of durability with position was found in Beech but red h.w. seemed to be slightly more resistant than white h.w. No relation was found between durability and site.

815. Effect of Growth Factors on Structure and Properties

See also Nos. 2258, 2268, 2296, 2298, 2327, 2349.

2350. ANDERSON, M. L. **Effect of site and silvicultural treatment upon timber quality.** *Quart. J. For.* 52 (4), 1958 (272–90 + 3 plates).

Internal and external attributes of timber quality in the standing tree are indicated. The effect of site on timber quality, and the means at the silviculturist's disposal for influencing quality (especially by selection, initial spacing, thinning, etc.) are discussed.

2351. RENDLE, B. J. **Some recent work on factors affecting the quality of softwoods.** *Quart. J. For.* 52 (4), 1958 (308–11). 7 refs.

Reviews work (mainly American) [cf. *F.A.* 19 Nos. 2330, 4742] which tends to confirm that little relationship exists between growth rate and wood density in softwood species, and that there is good reason to grow conifers at the fastest rate compatible with silvicultural considerations.

2352. RENDLE, B. J., and PHILLIPS, E. W. J. **The effect of rate of growth (ring width) on the density of softwoods.** *Forestry* 31 (2), 1958 (113–20 + 1 photo). 9 refs.

A revision of the paper presented to the British Commonwealth Forestry Conference in 1957 [cf. *F.A.* 19 No. 934].

2353. ŠKRIPEŇ, J., and RIASOVÁ, T. Stavba dreva a objemová váha borovice obyčajnej (*Pinus silvestris*) na Slovensku. **[The wood structure and density of *P. sylvestris* in Slovakia.]** *Drev. Výskum* 3 (1), 1958 (27–48 + 2 plates). 22 refs. [Slovak.russ.g.e.] P.R.

Using 1·6m.-long sections of stem, cut immediately above breast height, measurements of (*a*) width of annual rings, (*b*) late-wood %, (*c*) tracheid length, and (*d*) density were made on a total of 40 sample trees aged up to 110 years from the 3 Slovakian ecotypes of *P. sylvestris*, and from artificially planted *P. sylvestris* in W. Slovakia. Mean values obtained, in the site order Carpathian, Spiš, Šariš, and W. Slovakia, were for (*a*), in mm.: 1·86, 1·41, 1·61, and 1·58; for (*b*), in %: 32·3, 34·0, 28·8, and 32·8; for (*d*), in g./c.c.: 0·547, 0·515–0·519, 0·515–0·519, 0·556. In investigations on (*c*) it was found that the average for all Slovakia was 2·68 mm. The Pine attains max. density values where (*a*) = 1·4 mm., and (*d*) bears a linear relationship to (*b*).

2354. GÖHRE, K. Über die Verteilung der Rohwichte im Stamm und ihre Beeinflussung durch Wuchsgebiet und Standort. **[The distribution of density through the stem, and the effect on it of growth region and site.]** *Holz Roh- u. Werkstoff* 16 (3), 1958 (77–90). 14 refs. [G.g.e.] P.R.

Discusses results obtained by other authors and summarizes published results for Douglas Fir, Pine and Beech [see *F.A.* 19 No. 935] and for *Populus* × *regenerata* and *P.* × *marilandica*. Concludes that statistically significant differences within sites are so great that differences between sites and regions are comparatively unimportant.

2355. HAUGHT, E. **Distribution and extent of compression wood in Loblolly Pine.** *1st Rep. For. Tree Impr. Progr. Sch. For. N.C. St. Coll.* 1957 (14).

Compression wood was found to average ca. 42% by volume in juvenile wood (laid down in first 8 years) against 7% in mature wood. Fewer than 10% of trees examined were found to be free from compression wood, though the trees studied were only the best dominants and co-dominants in the stand.

2356. HAUGHT, E. **[Further study on compression wood in Loblolly Pine.]** *2nd Rep. For. Tree Impr. Progr. Sch. For. N.C. St. Coll.* 1958 (7).

The amount of compression wood (expressed in % of total merchantable volume of tree) was found to vary from 6% in reasonably straight trees, 9·1% in rather more crooked trees (but such as might be left as seed-trees) to 67·1% in a very crooked tree. Indications are that the amount of compression wood associated with knots occupies about the same volume as the actual knots in the bolt.

2357. **Project I—variation in fiber yield among individual Loblolly Pine trees.** *1st Rep. For. Tree Impr. Progr. Sch. For. N.C. St. Coll.* 1957 (9–11). [Cf. *F.A.* 19 No. 1391.]

In connexion with this study, many measurements of sp. gr. have been made. It was found that variation in sp. gr. between individual dominants of the same age, growing on the same site, was very great, and it appears that some of this variation is genetic. It was found that so-called juvenile wood (laid down in first 8 years) had a much lower sp. gr. (0·41–0·45%) than mature wood (0·52–0·56).

2358. **Assessment of wood quality [from wood structure].** *Rep. For. Prod. Aust. 1957/1958*, 1958 (6).

The examination of wood from pith to bark of 13 standing élite trees of *Pinus elliotti* [cf. *F.A.* 19 No. 3384] has been completed. Preliminary results show a high correlation (1% level) of fibre length with micellar angle [m.a.] and of basic density [b.d.]

with % of late wood; correlations (5% level) were also found of both m.a. and b.d. with longitudinal shrinkage. Similar studies are being made of 30 élite trees of *P. radiata*. With both species it is hoped to determine the trees with the best-quality wood from various factors, but especially from fibre ength and late-wood %.

2359. KONING-VROLIJK, G. M. C. Samenhang tussen anatomische structuur en mechanische eigenschappen bij eikehout. **[Relationship of structure and mechanical properties of Oak.]** *Repr.* from *Houtwereld, Netherlands* Aug. 30th, 1958. pp. 4. [Du.] P.R.

Strength tests were made on samples of Oak heartwood imported from 4 districts of France. In all samples, the side nearest the core was denser and had higher strength values than that furthest from it, the differences being greater in samples from Nevers and Avellon than in those from St. Quentin and Chaumont. Photomicrographs are included, illustrating the differences in annual ring breadth, early and late wood %, etc., between the samples, and between core and sapwood sides.

82. Conversion, Shaping, Assembly and Finishing of Wood: General

See also Nos. 2311–4.

2360. THUNELL, B. Schnittkraftbestimmung bei der Holzbearbeitung. **[Analysis of cutting forces in woodworking.]** *Holz Roh- u. Werkstoff* 16 (4), 1958 (138–45). 57 refs. [G.g.e.] P.R.

Discusses the difficulties in isolating cutting force proper from other forces (e.g. friction and transport of chips), complicated by the initial cutting impact, and describes electric and other apparatus (e.g. a pendulum dynamometer) used in Sweden for such investigations.

2361. MALYŠEV, V. V. Režuščie instrumenty s plastinkami iz tverdyh splavov. **[Cutting instruments with hard-alloy tips.]** *Derev. Prom.* 7 (8), 1958 (7–9). 1 ref. [Russ.] P.R.

Gives data on the design, manufacture, and performance of frame and circular cross-cut saws, tenon cutters, and spindle moulders, all having inserted, welded, hard-alloy cutting tips. Results so far are satisfactory, but further research on materials, standardization and construction technique is urged.

2362. HAIDT, H. Spandickenbegrenzte Hartmetall-Fräswerkzeuge in der Holzindustrie. **[The use of carbide-tipped milling tools with limited depth of cut in the woodworking industry.]** *Holz Roh- u. Werkstoff* 16 (8), 1958 (315–8). [G.g.e.] P.R.

Discusses some recent developments in carbide-tipped tools, with some information on running speeds and maintenance.

2363. JANIŠEVSKIJ, A. F. Sniženie vibracii derevorežuščih stankov. **[Reducing vibration in woodworking machines.]** *Derev. Prom.* 7 (10), 1958 (10–1). 1 ref. [Russ.] P.R.

Lists medically approved limits to vibration amplitudes for various vibration frequencies and machine strokes or revs./min., develops formulae for checking machine vibrations, and suggests measures to reduce, eliminate or avoid vibration.

2364. Gruppenschau Holzbearbeitungsmaschinen auf der Deutschen Industrie-Messe Hannover 1958. **[Exhibition of woodworking machines at the German Industry Fair, Hanover 1958.]** *Holz Roh- u. Werkstoff* 16 (8), 1958: *suppl.* pp. 15. [G.] P.R.

Brief description, with illustrations, of exhibits by over 35 firms, mainly German.

821. Barking

See also No. 1878.

2365. Eine neue Entrindungsmaschine. **[A new barking machine.]** *Holz Roh- u. Werkstoff* 16 (2), 1958 (69). [G.] P.R.

Describes, with illustrations, the PR barking machine, for use in the mill, in which logs up to 2 m. in diam. and 3·3 m. in length are rotated against a cutter head travelling parallel to the log axis; feelers on either side of the cutter head determine the depth of cut.

822. Saws and Sawing

See also No. 2236.

2366. ANTOINE, R. C., and BERBEN, J. C. Le débit des bois à la scie à ruban. III. Étude du sciage de *Staudtia stipulata*, *Guarea cedrata*, *Cynometra alexandri*, et *Pycnanthus angolensis*. **[Conversion by bandsaw. III. Sawing *S. stipulata*, *G. cedrata*, *C. alexandri* and *P. angolensis*.]** *Publ. Inst. nat. Étude agron. Congo belge* (*Sér. tech.*) No. 53, 1958. pp. 75. 2 refs. [F.]

[Cf. *F.A.* 18 Nos. 2132–3.] The factors of the sawing operation are investigated for each of these timbers, using reinforced teeth of 'parrot beak' and 'briar thorn' shape with 5° clearance angles and 50 mm. pitch, a saw speed of 1800 m./min. and 20 cm. depth of cut as standard. The cutting angle (hook) and optimum bite for *Staudtia* are 25° and 500–600 μ, for *Guarea* 25° and 800 μ, *Cynometra* 25° and 400μ, *Pycnanthus* 30° and 1000 μ, compared with *Chlorophora excelsa* 15° and 800 μ. For each of these timbers a chart is given from which to read the desirable combination of feed and saw speed, power at the saw, and depth of cut when using these saws.

2367. JONES, D. S. **Sawing Brush Box [*Tristania conferta*].** *Aust. Timb. J.* 24 (8), 1958 (130 . . . 140).

Discusses the causes of difficulty in ripping the cross-grained, waxy, dense timber and shows that reducing spindle speed from 850 rev./min. (that in use) to 660, giving a saw speed for a 44-in. saw of 7500 ft./min. and keeping the feed virtually unaltered (194–187 ft./min. for a 4-in. depth of cut) resulted in satisfactory sawing with savings in total h.p. and energy consumption.

2368. BROADHURST, V. A. **The correct fencing of circular saws.** *Timb. Technol.* 66 (2232), 1958 (497–9).

Discusses safety regulations, protective guards above and below the bench, and the part played by the riving knife in guarding the saw.

2369. HOMBERG, E. Einsatz und Behandlung konischer Kreissägenblätter. **[Uses and maintenance of swage- or taper-saw blades.]** *Holz-Zbl.* 84 (115), 1958 (1463). [G.]

Discusses practical experience, types available, speeds, etc., including simple heating devices, working by friction, to ensure that the centre of the blade has the same temperature as the tooth line.

2370. KARL, G. Ein Gattervorschub mit Kreuzgelenken. **[A frame-saw feed with universal joints.]** *Holz Roh- u. Werkstoff* 15 (7), 1957 (301–2). 2 refs. [G.e.] P.R.

Discusses the technical possibility of adjusting feed speed to the periodically varying speed of a frame-saw by fitting one or two universal joints between the main driving shaft and the feeding device.

2371. IVANOV, A. G., *et al.* Puti povyšenija proizvoditel'nosti i ėkspluatacionnyh pokazatelej pil. **[Ways of increasing the productivity and efficiency of saws.]** *Derev. Prom.* 7 (5), 1958 (8–12). [Russ.russ.] P.R.

A series of trials with several experimental steels of different compositions (tabulated), hardening methods, etc., was made in an effort to find a wear-resistant steel that, when made into frame-saw blades, would yet have sufficient plasticity and allow good-quality cold swaging. It was found that isothermal hardening resulted in better impact toughness and 'swageability' than did broken hardening, which in turn was better than oil hardening. Breakdown of the tooth edge in saws made from the experimental steels was 2·4–3·2 times less than in standard steels and enabled the number of spells of work before re-swaging to be increased 2–2·5 times. It was also found advisable to lower the C content of the steels to 0·6–0·7%, and, for heavy work, to add up to 1% Ni.

823. Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning

2372. MANG, W. Zerspanunguntersuchungen über die Abnutzung von Fräserschneiden beim Gleich- und Gegenlauffräsen. **[The blunting of rotary cutters in forward and counter motion.]** *Mitt. dtsch. Ges. Holzforsch.* No. 40, 1958. pp. 80. 38 refs. [G.] P.R.

Studies the effect of glue-lines on blunting in the machining of laminated Beech made from three 2-mm. sliced veneers, testing the effect of types of glue, and age and thickness of glue-lines under various conditions of feed, cutter speed, cutting angle, tool materials etc. Preliminary tests on the effect of these variables were made on solid Beech and Teak, and the merits of various criteria and methods for measuring wear are discussed. Blunting was worst with polycondensation-type glues, less with polymerization types and least with protein glues, i.e. wear was greatest with the very brittle glues. Though not necessarily related to bond strength, wear was, for each glue, least shortly after pressing and less for thin than for thick lines. Fillers and extenders were not tested. High feed speeds were generally best. For glued wood, tools of high-speed metal and, for a long production line, carbide-tipped tools, are most economical.

2373. TSCHERNJAKOW, K. Maschinen, Werkzeuge und Einrichtungen zum Oberfräsen. **[Routing machinery, tools and equipment.]** *Holz Roh- u. Werkstoff* 15 (7), 1957 (303–13). [G.g.e.] P.R.

Discusses high-frequency drives, copy-cutting devices, economic efficiency, etc.

2374. DÜWER, H. Rationalisierung in der Holzindustrie durch Einsatz von Doppel-Endprofilern. **[Rationalization in the wood industry by using double end tenoning machines.]** *Holz Roh- u. Werkstoff* 16 (8), 1958 (310–5). [G.g.e.] P.R.

824. Forms of Joint. Jointing and Assembly

824.1. Nailed Joints

See also No. 2391.

2375. MEYER, A. Die Tragfähigkeit von Nagelverbindungen bei statischer Belastung. **[The bearing strength of nailed joints under static load.]** *Holz Roh- u. Werkstoff* 15 (2), 1957 (78–109). 9 refs. [G.g.e.] P.R.

Tests carried out with nailed joints of woods having equal, different, and high pin-bearing strength, as well as with standard and high-grade steel nails, wooden nails, and nails made of improved wood ['Compreg'], showed that the strength of the joint is affected by the thickness and pin-bearing strength of the wood used, and by the cross-breaking strength of the nail. The use of nails made of high-grade materials and of fish and gusset plates of woods with a high pin-bearing strength may yield considerable structural advantages. The permissible working load of all nailed joints can be derived with sufficient accuracy from the load, based on the beam action of the nail, according to the simple load assumptions of K. W. Johansen and T. Müller. The 'rope' effect exercised by the nail is neglected in calculating load capacity, as it is subject to wide fluctuations. When working out the dimensions of nailed joints, it is well to select a member of thickness sufficient to permit the maximum movement of the nail throughout the wood. The permissible working load of bolted joints and of other joints with links stressed mainly as a result of bending forces, can also be derived from the load based on the beam action of the nail. *From author's summary.*

2376. MEYER, A. **The bearing strength of nailed joints under static load.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3554, [1957]. pp. 24 + 8 dgms., 4 gphs., 19 tbls. 9 refs. Transl. by J. Hardy from *Holz Roh- u. Werkstoff* 15 (2), 1957 (96–109). [See preceding abstract.] Limited distribution. P.R.

2377. STERN, E. G. **Nailing of plywood sheathing with 'Hi-Load' [threaded] nails.** *Bull. Wood Res. Lab. Va. polyt. Inst.* No. 35, 1958. pp. 15. P.R.

Better results were obtained when traditional common wire nails were replaced by properly threaded nails of shorter length and extra large shank diameter.

824.2. Screwed Joints

2378. SAARMAN, E. Skruvars hållkraft i trä och träprodukter. **[Withdrawal resistance of screws in wood and wood products.]** *Medd. svenska Träforskn-Inst.* (*Träteknik*) No. 96*B*, 1958. pp. 7. [Sw.] P.R.

Screws were either screwed into pre-bored holes, or partly hammered and partly screwed directly into wood, plywood, coreboard or chipboard. With medium screws (No. 10) withdrawal resistance was similar from wood and coreboard, but lower from plywood, and this difference increased with increasing screw thickness though it was insignificant with thinner screws (No. 6). Chipboard gave varying results. With pre-boring, the diameter of the hole in the range 1·4 to 3·6 mm. for screws with a shank-diameter range of 2·8 to 6·15 and a core-diameter range of 1·9 to 3·6 mm. had little effect on withdrawal resistance; resistance was considerably lower when screws were partly hammered, partly screwed into position, but the differences were less with plywood. Direct linear relationships were found between resistance and wood density or shearing strength. A formula for calculating permissible loads is given.

824.8. Glues and Gluing

See also Nos. 2232, 2235, 2418.

2379. SUCHSLAND, O. Über das Eindringen des Leimes bei der Holzverleimung und die Bedeutung der Eindringtiefe für die Fugenfestigkeit. **[The penetration of glue in wood gluing and the significance of penetration depth for the strength of glue joints.]** *Holz Roh- u. Werkstoff* 16 (3), 1958 (101–8). 12 refs. [G.g.e.] P.R.

The penetration of a cold, water-resistant glue into Spruce, studied in microscopic sections by incident light [cf. *F.A.* 18 No. 4512], showed that even when an excess of glue was present in the joint, penetration was not complete. An increase in the grain angle caused a flow of glue into the early-wood cells. When end-grain wood was glued, a degree of penetration of only 60% was reached. The tensile strength of glued Pine veneers of different thickness, and consequently penetrated to different relative depths, was compared with that of unglued veneers. In unglued veneers (two kept together with tape) tensile strength increased with veneer thickness; gluing increased veneer strength, the difference being greatest (70%) with veneers 0·2 mm. thick (i.e. with the higher relative penetration) and decreasing to 10·5% with veneers 2·0 mm. thick. In a study of hot-glued Pine and Birch veneers, it was found that penetration could be varied by varying the amounts of glue applied. Shear tests showed no relationship between penetration and joint strength. The causes of difficulty in end-gluing are discussed.

2380. CLAD, W. Prüfung gefüllter Leime. **[Testing glues with fillers.]** *Holz Roh- u. Werkstoff* 16 (10), 1958 (383–95). 19 refs. [G.g.e.] P.R.

A detailed investigation on the behaviour of glue lines of various thicknesses, and their strengths. Filled glues are essential for glue lines $> 0{\cdot}5$ mm. thick, and tests of tensile strength $\perp$ are thought to be more useful than shear tests.

2381. NARAYANAMURTI, D., and PANDE, H. C. **Studies on adhesives: further experiments with prolamin and Cashew shell oil.** *Comp. Wood* 4 (6), 1957 (97–103). 5 refs. P.R.

Experiments indicated that satisfactory glues can be developed from gluten, with various substances to swell the gluten and thus to activate the prolamin contained in it, or from Cashew shell oil. Tabulated results include those showing glue adhesion with 8 Indian timber species.

2382. KNIGHT, R. A. G., DOMAN, L. S., and SOANE, G. E. **Investigations into glues and gluing. Progress report 110—July 1958. The durability of glues for plywood manufacture. Series V and C.** Forest Products Research Laboratory, Princes Risborough. 1958. pp. 31. Limited distribution. P.R.

2383. DERKOVSKAJA, I. L. Karbamidnyj klej s povyšennoj vodostojkost'ju. **[Urea glues with increased resistance to water.]** *Derev. Prom.* 7 (10), 1958 (8–10). [Russ.] P.R.

Shear-strength tests of Scots Pine samples glued with formulations from various recipes, showed that the introduction into urea-formaldehyde resin of melamine (10–25% by weight of the urea) resulted in resistance to water at least equal to that of phenol glues. Further advantages are quicker hardening and the absence of staining on the glue line.

2384. SAMEK, J. Porovnání vlivu některých syntetických lepidel na kvalitu lepení při výrobě vodovzdorných překližek. **[Comparison of the effect of some synthetic glues on bond quality in the production of waterproof plywood.]** *Drev. Výskum* 3 (1), 1958 (115–26). 7 refs. [Cz.cz.russ.g.e.] P.R.

Gives the results of shear and cleavage strengths of Beech plywood bonded with five Czechoslovakian glues. The best was a phenol-resol, UMA D-1.1.5., followed by a cresol-resol TF-60.

2385. CARRUTHERS, J. F. S., and PAXTON, B. H. **Radio frequency and other heating processes. Progress report 17, May, 1958. The performance of some synthetic resin glues under radio frequency heating.** Forest Products Research Laboratory, Princes Risborough. 1958. pp. 4 + 5 tbls. Limited distribution. P.R.

2386. WÄSTBERG, G. Die Hochfrequenz-Holzverleimung in Schweden. **[Radio-frequency gluing of wood in Sweden.]** *Holz Roh- u. Werkstoff* 16 (5), 1958 (177–83). [G.g.e.] P.R.

Describes installations used in Swedish factories, discussing generators, heating systems (longitudinal or diffuse field heating), glues etc., with illustrations taken from the manufacture of doors, and door frames, building components, moulded plywood and coat-hangers.

2387. KNOKEY, E. R. **A continuous method of scarf jointing plywood panels.** *For. Prod. J.* 8 (8), 1958 (17*A*–19*A* + 1 photo).

The operation described uses a R.F. scarfing press, plus limit switches and timed relays to secure absolute straightness in panels up to 160 ft. long. Their main use is as the top chord in bow-string trusses.

2388. McKEAN, H. B., and SMITH, J. W. **Pilot planting laminated 2 by 4's.** *For. Prod. J.* 8 (8), 1958 (19*A*–23*A*). 3 refs.

Describes the development of a process using a preheating technique, for laminating 1 × 4's to make 2 × 4's. Results were promising with White Fir and Douglas Fir, but less so with lower-quality Southern Pines. [Cf. *F.A.* 17 No. 4443.]

2389. PERKITNY, T. Ein neues Verfahren für schnelle Heissverleimung und gleichzeitige Imprägnierung von Lagenhölzern beliebig grosser Abmessungen. [**A new method of rapid hot gluing and simultaneous impregnation of laminates of any size.**] *Holz Roh- u. Werkstoff* 16 (3), 1958 (97–101). 2 refs. [G.e.] P.R.

Describes the Imperkol process and discusses its advantages and uses. [Cf. *F.A.* 20 No. 1075.]

2390. SELBO, M. L., and GRØNVOLD, O. **Laminating preservative-treated Scotch Pine.** *For. Prod. J.* 8 (9), 1958 (25*A*–26*A*). 4 refs.

Preservatives used were Celcure (acid Cu chromate), Boliden salts, and creosote, at mean retentions of 0·72, 0·37, and 5·69 lb./cu. ft. respectively; glues, acid-catalysed phenol, two resorcinols, and a phenol-resorcinol; temperatures, 15°, 25°, and 35° C. Shear and delamination tests indicated that only creosote materially reduced bond strength. Higher temperatures improved this generally, and it is thought that creosoted wood may be glued satisfactorily at 35° or over. One resorcinol gave poor bonds at the lower temperatures. Initial results with the acid-catalysed phenol were satisfactory.

2391. KOLB, H. Versuche über die Verwendung von Nägeln zur Erzeugung eines ausreichenden Pressdrucks bei der Bauholzleimung. [**The use of nails to maintain an adequate pressure while gluing structural wood.**] *Holz Roh- u. Werkstoff* 16 (1), 1958 (28–35). 6 refs. [G.e.] P.R.

Strength tests showed that satisfactory pressure could be obtained by means of wire nails. It is stressed, however, that the specimens had an average moisture content of 12–15%, that they were chosen and worked with special care and that they were small compared with those used in practice. Diagrams and photographs show the dimensions and structure of test constructions, arrangement of nails etc.

826. Peeling. Slicing. Trimming, Edging etc. of Thin Sheets

2392. KIVIMAA, E., and KOVANEN, M. **Microsharpening of veneer lathe knives.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3907, 1958. pp. 10 + 13 dgms., gphs. & photos. 5 refs. Transl. by N. King from *Tied. Valt. tekn. Tutkimusl.* No. 126, 1953. [See *F.A.* 16 No. 995.] Limited distribution.

2393. VOL'SKIJ, E. V. O zatočke režuščego instrumenta dlja luščenija volnistogo špona. [**The grinding of cutters for peeling wavy-surfaced veneer.**] *Derev. Prom.* 7 (3), 1958 (7–8). [Russ.] P.R.

Presents formulae for calculating the basic relations between knife blade and wave pitch (interval) and depth, and describes and illustrates the device developed by CNIIFM for grinding the knife to the required profile for making wavy veneer.

2394. STRÜBING, J., and HARBS, C. Betriebsmessungen an Furniermessermaschinen. [**Workshop tests on veneer slicers in practical operation.**] *Repr.* from *Holz Roh- u. Werkstoff* 6 (5), 1958 (183–90). 6 refs. [G.g.f.]

Describes tests measuring power consumption at the drive on machines operated by crank drive or by electro-magnetic friction clutch. Chief factors affecting power consumption were width and length of veneer and number of cuts per min., and the state of maintenance of the machine, the latter affecting particularly the very high power-consumption during idle running phases. Thickness of veneer, species, density, pre-treatment and temperature of the wood were of minor importance, suggesting that friction forces at the pressure bar and knife exceed the forces required for cutting. *From authors' summary.*

827. Bending. Moulding (other than by Cutting)

See also Nos. 2486, 2532.

2395. FESSEL, F. Gebogene Hölzer in der Möbelindustrie. [**Bent wood in the furniture industry.**] *Holz Roh- u. Werkstoff* 16 (2), 1958 (64–8). 6 refs. [G.g.e.] P.R.

Discusses the historical development of wood bending techniques, methods in use today, and the range of uses of bentwood.

2396. STRONGIN, A. M., and ŠEPŠELEVIČ, V. L. Issledovanie processov izgotovlenija gnutopropil'nyh detalej. [**Investigation of the processes in making furniture parts of bentwood with kerfs.**] *Derev. Prom.* 7 (5), 1958 (4–5). [Russ.] P.R.

From the results of investigations on furniture parts of bentwood of cross-sections 19 × 19 to 52 × 82 mm. with longitudinal kerfs [cf. *F.A.* 19 No. 4856], tables were drawn up showing (1) the optimum thickness of inserts for the parts, for various radii of curvature and for various wood species, and (2) the optimum number of kerfs for parts of the various dimensions examined. It was found that 10–12 days after the parts had been bent, they showed an inward deflection of 3–4°, depending on the radius of curvature and on the distance between kerfs. Conclusions were also reached on the optimum gluing schedule, and method of finishing the parts.

2397. PATERSON, J. V. (to N.V. de Bataavsche Petroleum Maatschappij). **Improvements in or relating to the manufacture of curved Balsa wood members and structures incorporating such members.** *Brit. Patent* No. 797,026, 1958. pp. 10 + 2 sets of dgms. Price 3*s.* 6*d.* P.R.

Layers of Balsa are bonded together, cross-banded, and then bent so that the axis of curvature is parallel to the grain in the layer on the inner side of the bent member.

829.1. Finishing

2398. **List of publications on wood finishing subjects.** *Rep. U.S. For. Prod. Lab., Madison* No. 454, 1958. pp. 11. P.R.

All are N. American.

83. Timber Manufacturing Industries and Products. Uses of Wood as Such

See also No. 1865.

2399. Pesockij, A. N. Lesopil'naja i derevoobrabatyvajuščaja promyšlennost' Čehoslovakii. **[The sawmilling and woodworking industry of Czechoslovakia.]** *Derev. Prom.* 7 (8), 1958 (27–8). [Russ.] P.R.

A short account of some of the larger and more important undertakings.

2400. Borovoj, V. Ja. Derevoobrabatyvajuščaja promyšlennost' Rumynii. **[The woodworking industry in Rumania.]** *Derev. Prom.* 7 (10), 1958 (29–30). [Russ.] P.R.

Compares 1947 and 1957 production figures for coniferous, Beech, and Oak sawn timber, plywood, and hardwood parquet, and describes some of the new factories built.

2401. **[Wood industries in Hokkaido.]** *Wood Ind., Tokyo* 13 (1), 1958 (1–71). [Jap.] P.R.

A number devoted to the wood industry in Hokkaido, and containing 26 articles on different aspects of the industry.

831. Fuelwood and Various Types of Rough Timber

See also Nos. 2424, 2467–8, 2470, 2474–5, 2517.

2402. Boyd, J. D. **How strong are wooden fence posts?** *For. Prod. Newslett. C.S.I.R.O. Aust.* No. 244, 1958 (1–2).

The breaking force (lb.) applied to posts at 2 ft. 8 in. above ground was for: vibrated reinforced concrete, 6 × 4 tapering to 4 × 4 in., 450; prestressed concrete, 3½ in. triangular, ca. 900; 5-in. diam. round treated Swamp Gum 5300; ditto Longleaved Box 5700; sawn Grey Box, 8 × 3 in. (one-third of a round wood post in cross-section), 2650; Y-section steel, 200–240. Treated round wood posts are superior in handling, use, wear, durability and probably cost.

2403. El problema de abastecimiento de durmientes. **[The supply of railway sleepers [in Argentina].]** *Bol. argent. for.* 16 (154), 1957 (6). 1 ref. [Span.]

Replacements have never reached 1 million per year and the annual requirement was estimated (1956) at 3,400,000, which could be supplied in local timbers, ideal for the purpose, viz. (1) Urunday [*Astronium balansae*], (2) Guayacan [*Caesalpinia melanocarpa*], (3) Itin [*Prosopis kuntzei*], (4) Quebracho colorado [*Schinopsis* sp.], which require no preservative treatment. (5) Quebracho blanco [*Aspidosperma quebracho-blanco*] which, like (2), regenerates naturally with ease, and 4 other species are listed as suitable when impregnated. The failure in local supplies is ascribed to (*a*) fixing the price too low by the railway monopoly; (*b*) improvident requisitions; and (*c*) neglect by the railways, leading to degrade in sleepers requiring impregnation.

832. Mills, Their Functions and Products

2404. Kossatz, G. Entwicklungswege der baulichen Anlagen in der holzverarbeitenden Industrie. **[Development trends in buildings in the woodworking industry.]** *Holz Roh- u. Werkstoff* 16 (10), 1958 (395–408). 30 refs. [G.g.e.] P.R.

Reviews the history of building development in the industry, and the factors to be considered when designing a plant. The multiplicity of types of building required makes it impossible to propose a single standard design, but basic principles of general validity are deduced.

832.1. Sawmills and Planing Mills

See also Nos. 2366–71, 2543–5.

2405. Hyler, J. E. **Modern sawmilling. Pts. 102–107.** *Sth. Lumberm.* 197 (2460–2465), 1958 (41 . . . 46; 37 . . 48; 35 . . . 39; 35 . . . 38; 39 . . . 46; 185 . . . 188).

Resaws, and chemical treatments against checking and attack by fungi and insects, including equipment, methods, and preservatives.

2406. **'Idea' mill of the year.** *Lumberm.* 85 (11), 1958 (34–9).

Describes a mill in Arkansas producing 100,000 bd. ft. of lumber/8-hr. shift from an average of 1920 Southern Pine logs, and designed to reduce man-hours/1000 bd. ft. from the local mean of 22 to 10–12. The horizontal bandsaw, 3 gangs, resaw and 2 edgers were selected for the actual weights of green and dry lumber worked (to save power). Chip recovery and kilning are practised. The economies aim at covering open-market log purchases, interest, and reasonable profit.

2407. **Small log mill.** *Lumberm.* 85 (11), 1958 (44–8).

Describes a Crown Zellerbach subsidiary's saw and planing mill in Vancouver Island, designed on the basis of American and Swedish experience, to convert Douglas Fir logs, 6–24 in. in diam. Equipment includes a barker, log cut-off saw, 3 frame saws (2 in tandem), 2 edgers and trim saws. Chip recovery for pulp (for which the logs are now considered too valuable) is included.

2408. Serry, V. (to Phoenix Timber Co., Ltd.). **Improvements relating to the sorting of boards and timber and similar elongated articles according to length.** *Brit. Patent* No. 798,556, 1958. pp. 3 + 5 dgms. Price 3*s.* 6*d.* P.R.

The apparatus described comprises a continuous ledge less than ½ the width of the articles to be sorted, for supporting one long side of the articles as they are fed endwise, one behind the other, and co-operating local supports for the other long side of each of the articles, successive local supports being set apart longitudinally at distances slightly in excess of a series of nominal lengths into which the articles are to be sorted.

2409. Jones, D. S. **Improving the work balance between breaking down and benching.** *Repr.* from *Aust. Timb. J.* 24 (6), 1958 (64–92). (*Repr. For. Prod. Aust.* No. 360.)

Analyses, in 4 mills using circular breakdown saws and resaws, the time taken and lost in 4 operations at the headrig, viz. time lost in waiting (to receive or

pass on material), mechanical trouble, changing and adjusting saws; and the accuracy of the sawing (mainly with Eucalypts), and shows possible labour savings of £1000–4000/year, principally by giving more work to a more accurately sawing headrig.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-Wood Assemblies

See also Nos. 2310, 2379 *et seq.*, 2392–4, 2397, 2423, 2427, 2430, 2445, 2462, 2482, 2582.

2410. **Manufacturing Klinkii plywood.** *Aust. Timb. J.* 24 (8), 1958 (66 . . . 117).

A detailed description of the cycle of operations of Commonwealth-New Guinea Timbers Ltd. at Bulolo, New Guinea, probably the most up-to-date plywood organization in the southern hemisphere. Of the timbers peeled (or sawn), the chief is *Araucaria klinkii*, but *A. cunninghamii* makes up 5% of the softwood stands (500 million bd. ft.) on which the company draws.

2411. MAROTTE, P. L'industrie du placage en France: les bois tropicaux. **[The veneer industry in France: [the use of] tropical timbers.]** *Bois For. Trop.* No. 61, 1958 (39–50). [F.]

[Cf. *F.A.* 18 No. 1006.] Lists 30 African, 2 Indonesian, 2 Indochinese, 3 Indian, 2 Australian, 2 Japanese, and 26 tropical American species, giving trade and native names, provenance, and colour.

2412. **Trials of timber for plywood manufacture. Progress report 48, September, 1958. White Seraya *Parashorea malaanonan*—North Borneo. Consignment No. 964.** Forest Products Research Laboratory, Princes Risborough. 1958. pp. 7. Limited distribution. P.R.

The timber is provisionally assigned to group I—successfully used in British mills.

2413. **Trials of timber for plywood manufacture. Progress report 49, September, 1958. Dark Red Seraya—*Shorea pauciflora*—North Borneo. Consignment No. 966.** Forest Products Research Laboratory, Princes Risborough. 1958. pp. 8. Limited distribution. P.R.

The timber is provisionally assigned to group II; it is believed to be suitable for British mills provided that the gluing with P.F. can be improved.

2414. **Trials of timbers for plywood manufacture. Progress report 50, September, 1958. African Mahogany—*Khaya grandifoliola*—Nigeria. Consignment No. 967.** Forest Products Research Laboratory, Princes Risborough. 1958. pp. 7. Limited distribution. P.R.

The timber is provisionally assigned to group III; it is unsuited to British mills because of irregular grain and excessive weight, but is technically sound for plywood and might be valuable for this purpose in its country of origin.

2415. WATANABE, H. **[The performance of veneer driers.]** *Wood Ind., Tokyo* 13 (4), 1958 (20–4). 7 refs. [Jap.e.*e.*] P.R.

Gives performance data in graphs and tables for 7 commercial veneer driers, with veneers of several different species. Veneer thickness ranged from 0·9 to 1·8 mm., and m.c. from 59 to 149·5%.

2416. MIEKI, S., and KADITA, S. **[The effect of species and position in the log on the shrinkage of rotary Lauan veneers.]** *Wood Ind., Tokyo* 13 (5), 1958 (19–23). [Jap.e.*e.*] P.R.

Rotary-cut veneer test-pieces 75 × 216 cm., and 1·2 mm. thick, from positions 2·5, 5, 10, 15, 20, 25 and 30 cm. from the surface of the sapwood, were prepared from *Shorea negrosensis*, *S. polysperma*, *S. squamata*, *S. almon* and *Parashorea malaanonan*. Tangential shrinkage, and shrinkage in the fibre direction, were measured both before and after drying at ca. 150° C. for 8 min. The tangential shrinkage and sp. gr. are graphed for each species and for each original veneer position in the log, and tangential shrinkage is also graphed against d/R (d = distance from surface of sapwood, R = log radius) for each species. *From authors' summary.*

2417. SOLARI, F. S. Estudio de maderas terciadas de industria nacional—características de chapas. **[Study of plywood in the national industry—characteristics of plywood panels.]** [*Publicación*] *Laboratorio de Ensayo de Materiales e Investigaciones Tecnológicas, La Plata* (*Ser. 2*) No. 71, 1957. pp. 12 + 6 tbls. [Span.span.e.]

A preliminary study of the properties of plywood of average quality, produced by the principal factories of Argentina. Tabulated data are presented on plywood made from *Araucaria angustifolia*, *Cedrela tubiflora* and *C. balansae*. The variability in results and the many deficiencies observed point to the necessity for standardization at every stage.

2418. YAGISHITA, M. **[The results of weathering tests on veneer-overlay plywood.]** *Wood Ind., Tokyo* 13 (3), 1958 (17–20). 3 refs. [Jap.e.*e.*] P.R.

Sliced Tamo [*Fraxinus mandshurica*] veneers, 0·3, 0·5 and 0·7 mm. thick, were hot-pressed on to plywood and then subjected to accelerated weathering in a WE-SH-2 weather meter. Better results were obtained with the thinner veneers and when these were glued on the tight side. *From author's summary.*

2419. AŠKENAZI, E. K., and GURKIN, G. S. K voprosu o pročnosti fanery. **[Notes on the strength of plywood.]** *Derev. Prom.* 7 (7), 1958 (14–6). 3 refs. [Russ.] P.R.

Discusses the theory of the strength of plywood, regarding it as a solid, anisotropic body, and as a material composed of elastic anisotropic layers.

2420. NORÉN, B., and SAARMAN, E. Schubversuche an Sperrholz. **[Shear tests on plywood.]** *Holz Roh- u. Werkstoff* 16 (1), 1958 (17–22). 3 refs. [G.g.e.] P.R.

Compares results obtained by various standard test methods.

2421. COLBECK, H. G. M., and NORTHCOTT, P. L. **Some factors influencing the design of Douglas-Fir plywood panels.** *For. Prod. J.* 8 (8), 1958 (226–9). 6 refs.

Reviews and analyses present designs using at least 17 thicknesses, and discusses possible advantages that might result from the adoption of only two standard thicknesses of veneer ($\frac{1}{10}$- and $\frac{1}{8}$-in.) from which all usual thicknesses of panels could be constructed.

2422. **[Modern wood-based materials.]** *Wood Ind., Tokyo* 13 (7), 1958 (2–61). Many refs. [Jap.] P.R.

Contains articles on the use of hardboard, particle board, semi-hardboard, softboard, Durisol, fancy-veneered plywood, special plywoods, block-board, laminated wood, and compreg, and on the prospects of these materials.

833. Timber in Buildings and Engineering Structures (Manufacture and Use)

833.1. Building Components and Fittings: General

See also Nos. 2235, 2377, 2391.

2423. PEARSON, R. G., KLOOT, N. H., and BOYD, J. D. **Timber engineering design handbook.** Commonwealth Scientific and Industrial Research Organization, Melbourne. 1958. pp. 248. P.R.

Supersedes the 'Handbook of Structural Timber Design' [see *F.A.* 12 No. 666]. Contains sections, all with particular references to Australian conditions, on: timber as a structural material; design loads; design stresses for solid timber; design of beams; columns; joints; trusses; glued laminated construction; structural use of plywood; proof testing (of prototypes) and preservation; and examples of timber structures; with a short glossary of timber terms, and an index. There are many tables and diagrams, and a number of photographs of actual structures.

2424. THUNELL, B. Sortierungs- und Sicherheitsfragen bei der Verwendung von Holz für Tragwerke und Gerüste. **[Problems of grading and safety in the use of timber for supporting structures and scaffolding.]** *Holz Roh- u. Werkstoff* 16 (4), 1958 (127–32). 5 refs. [G.g.e.] P.R.

A theoretical discussion, stressing the need for taking into consideration magnitudes of variance as well as mean values. [Cf. *F.A.* 17 No. 2195.]

2425. NORÉN, B. Sicherheitsprobleme im Holzbau. **[Safety problems in wood construction.]** *Holz Roh- u. Werkstoff* 16 (4), 1958 (146–50). 2 refs. [G.g.e.] P.R.

Discusses the uncertainty factors and variances entering into calculations of strength and stress, with special reference to the special behaviour, at variance with Hooke's law, of wood and joints, creep, ageing etc., with a view to achieving reliable grading, suitable joints, and economically competitive, yet safe, structures. The need for more research and modification of building regulations in the light of existing findings is stressed. *From author's summary.*

2426. HALASZ, R. v. Die Bedeutung der Forschung und Normung für die Verwendung des Holzes und seiner Werkstoffe im Bauwesen und im Wohnungsbau. **[The importance of research and standardization for the use of wood, and materials made from wood, in house and general construction.]** *Ber. dtsch. Ges. Holzforsch.* No. 1/58, 1958. pp. 10. [G.] P.R.

A lecture urging more standardization of building components, grading of boards etc., and including some specimen roof construction diagrams.

2427. PEARSON, R. G. **Design notes for plywood and timber in concrete formwork.** *Repr. For. Prod. Aust.* No. 363, 1958. pp. 11 + 2 dgms. (*Repr.* from 'Plywood for concrete formwork'. Australian Plywood Board, Brisbane.)

2428. DOYLE, D. V. **Performance of structural pole frames under test load.** *Rep. U.S. For. Prod. Lab., Madison* No. 2111, 1958. pp. 9 + 24 dgms., gphs. & photos. P.R.

Presents the results of tests of strength and rigidity of an experimental pole-frame construction.

2429. BROCHARD, F. X. Trente plans-types de charpente en bois. **[Thirty typical plans for timber framing.]** *Cah. Centre tech. Bois* No. 30*a–e*, 1958. Each pp. 14. [F.f.e.] P.R.

Consists of 5 pamphlets each with 6 typical plans for different types of truss.

2430. Holz-Leimbau. **[Glued timber constructions.]** *Informationsdienst Holz, Arbeitsgemeinschaft Holz e. V., Düsseldorf* 1958 (3). pp. 24. [G.] T.D.A.

An illustrated description, with an introductory article by K. Egner, of various types of laminated or plywood beams, mostly with modified I cross-sections, particularly the Hetzer, the Kämpfateg, the DSB, the Trigonit [cf. *F.A.* 16 No. 4615] and Wellsteg constructions and their applications.

2431. NORÉN, B. **Testing of timber roof structures by means of models.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3865, 1958. pp. 30 + ii + 10 gphs., dgms. & photos. 6 refs. Transl. by J. Hardy from *Medd. svenska TräforsknInst.* (*Träteknik*) No. 86–*B*, 1957. [See *F.A.* 19 No. 2386.] Limited distribution.

2432. Tableaux des charges admissibles dans les poutraisons, solivages, travaux de charpente: madriers, bastings, chevrons en bois résineux. **[Tables showing permissible loads in trusses, joisting and framing; beams, battens and rafters of coniferous woods.]** *Cah. Centre tech. Bois* No. 7 (2nd ed.) 1956. pp. 4 + 4 tbls. [F.] P.R.

2433. SUTHERLAND, W. M. **The pre-stressing of timber floors.** *Timb. Technol.* 66 (2232), 1958 (487–8).

Describes the method of pre-stressing used in New Zealand on an experimental scale with floors of 4 × 2-in. *Pinus radiata* dressed on 4 sides.

2434. TINTO, J. C. La madera de eucaliptos en la industria del parquet. **[Eucalypt wood in the parquet industry.]** [*Pap.*] *1as Jorn. argent. Eucalipto Asoc. for. argent.* No. 209–200, 1957. pp. 6. 5 refs. [Span.]

Discusses wood properties necessary to make good parquet flooring, manufacturing methods, and the use of Eucalypt woods in the Argentine industry. *E. globulus* and *E. viminalis* have all the necessary properties.

833.4. Special Uses in Agricultural Structures

2435. LÖFFLER, H. Holz- oder Betonhöfe? Holz im landwirtschaftlichen Bauwesen. **[Wood or**

concrete for farm buildings? Wood in farm building.] *Forst- u. Holzw.* 13 (21), 1958 (425–8). [G.]

Wood is able to compete with concrete as far as suitability, aesthetics and price are concerned. The reasons for the current decline in the use of wood for farm building in W. Germany are lack of publicity, and a failure to produce designs for wooden structures that can meet modern farming requirements.

2436. STERN, E. G. **Poultry houses with scissor-type nailed trussed rafters.** *Bull. Wood Res. Lab. Va. polyt. Inst.* No. 34, 1958. pp. [7]. 6 refs. P.R.

834. Shingles. Cooperage. Packing Containers. (Manufacture and Use.)

2437. PEARSON, F. G. O., and WEBSTER, C. **Timbers used in cooperage and the manufacture of vats and filter presses: a survey.** Forest Products Research Laboratory, Princes Risborough. [1958.] pp. 33. P.R.

2438. HEEBINK, T. B. **Evaluation of nine styles of fiberboard boxes with more than four sides.** *Rep. U.S. For. Prod. Lab., Madison* No. 2110, 1958. pp. 7 + 2 tbls., 1 set of dgms., 7 photos. P.R.

The strength of 9 different hexagonal and octagonal boxes was investigated by a free-fall, edge-drop test repeated to failure, and compared with that of rectangular control boxes.

2439. HEEBINK, T. B. **Bin pallets for agricultural products.** *Rep. U.S. For. Prod. Lab., Madison* No. 2115, 1958. pp. 10 + 24 dgms. & photos. P.R.

Examines the materials, design, and construction of bin pallets capable of holding 15–40 bushels, and makes recommendations.

835. Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Applications etc.

See also Nos. 2154, 2483–7.

2440. **Making wooden patterns.** *Timb. Technol.* 66 (2232), 1958 (489–90).

Discusses the making in Great Britain of wooden patterns for metal casting, woods used (Pine, Mahogany, and Jelutong), and problems encountered.

2441. ANDERSON, A. J. **Making wood pulleys.** *Woodwkg. Ind.* 15 (6), 1958 (322–4). P.R.

An illustrated review of production methods in the only British firm still making block- and spoke-type pulley wheels from wood; Beech and Sycamore Maple for the former, Beech, Lombardy Poplar and Willow for the latter.

2442. KOVJAZIN, F. JA. Novye materialy dlja proizodstva katušek. [**New materials for making bobbins.**] *Derev. Prom.* 7 (7), 1958 (26). [Russ.] P.R.

Experiments carried out by CNIIL Sevzaples in 1954–55 have led to the development of a process for making bobbins out of 'refined' wood fibres. This is said to result in considerable savings over conventional methods.

2443. WACKER, H. Die moderne Absatzfertigung. [**Modern heel manufacturing.**] *Holz Roh- u. Werkstoff* 15 (8), 1957 (340–53). [G.g.e.] P.R.

Describes the manufacture (turning and shaping techniques, etc.) of wooden heels for ladies' shoes.

836. Furniture and Cabinet-Making. Carving. Marquetry. Wooden Ornaments

See also Nos. 2395–6.

2444. Regards sur les industries de l'ameublement en Allemagne. [**The furniture industry in Germany.**] *Cah. Centre tech. Bois* No. 24, 1957. pp. 21. [F.] P.R.

Provides information on the location of the main centres, and discusses techniques, organization, and economic and social questions.

838. Vehicles (including Ships, Boats, Aircraft)

See also No. 2297.

2445. ANDERSON, J. **New techniques help boat builders.** *Woodwkg. Ind.* 15 (8), 1958 (436–8). P.R.

An account of the design and manufacture of racing craft (*a*) clinker-built without ribs, from $\frac{5}{16}$-in. 'planks' of plywood, (*b*) made from crossing 2·6 mm. layers of veneer, both of Gaboon and both hot-glued.

839.8. Industrial Waste Wood, its Processing and Uses

See also Nos. 2459–60.

2446. BOUBEL, R. W., *et al.* **Wood waste disposal and utilization.** *Bull. Ore. Engng. Exp. Sta.* No. 39, 1958. pp. 93. 92 refs.

Part 1: Incineration of wood wastes, includes sections on history, mechanics of combustion in wood-waste burners, experimental methods and equipment and results of experiments with burners of different design. Part II: Economics of wood-residue utilization, includes sections on quantity of material available, possible uses and economic considerations, and estimating production costs.

2447. **Waste utilization.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1956/57*, 1957 (89–90).

Investigation of fragmented wood as a soil improver, using incubated sawdust/soil mixtures, indicated maximum uptakes of N for *Pinus radiata*, *Eucalyptus sideroxylon* and *E. regnans* of 1·0, 1·4 and 1·6% of oven-dry wood respectively. Uptake was hardly affected by solvent extraction of the wood, and the agents of decomposition were observed to be microfungi, not basidiomycetes. Maximum uptake occurred 5–12 weeks after mixing, which indicated the need, under field conditions, for gradual application of N fertilizer. Release of N was very slow. Addition of limestone hastened the process. Germination of vegetable seeds of various species on sawdust of *E. regnans* and *P. radiata* indicated a depressive effect on seedling development of some species, associated partly with acidity.

2448. FOSLIE, M. Über den Festgehalt von gestapelten Schwarten. [**The solid content of piled slabs.**] *Holz Roh- u. Werkstoff* 16 (1), 1958 (1–7). 27 refs. [G.g.e.] P.R.

Earlier research is summarized and results of an investigation by the Norsk Treteknisk Institutt are given in tables and graphs. The % of solid wood volume decreases with increasing number of slabs in a pile, with increasing slab length, and with increasing proportions of slabs from the smallest widths of boards and from box shooks.

2449. NYLINDER, P. Fastmasseprocenter hos boardved, ribb och bakar samt flis. **[The % of solid volume in sawn boards, edgings, slabs and chips.]** *Uppsats. Instn. Virkeslära K. Skogshögsk., Stockh.* No. 16, 1958. pp. 26 + 19 photos, 10 tbls. 26 refs. [Sw.sw.e.]

Presents data on solid volume, green and dry weight, m.c., etc., based on > 1000 stacked cu.m. of boards (a mixed hardwood/softwood low-quality assortment), conifer sulphate pulpwood and industrial waste, and on 675 cu.m. of chips, and discusses methods, errors, variation etc.

84. Preservation and Other Treatments to Improve the Properties of Wood. Damage by Biological Agencies and its Control. Seasoning. Timberyard Practice

841. Wood Preservation

See also Nos. 1867, 2263, 2389–90, 2405, 2500, 2504, 2506, 2509, 2513–5, 2529, 2536.

2450. MIEDLER, K. A. **Summary report to the Royal Government of Thailand on timber seasoning and preservation research.** Expanded Technical Assistance Program, FAO, Rome. 1958. pp. 16. Limited distribution.

2451. **List of publications on wood preservation.** *Rep. U.S. For. Prod. Lab., Madison* No. 704, 1957. pp. 19. P.R.

All are N. American and mainly from the Laboratory itself.

2452. **Amenability to preservative treatment.** *Rep. For. Dep. Tanganyika 1957*, 1958 (27).

Tests on treatability gave the following results: *Cassipourea elliottii*, permeable except for small heart core; *Baikiaea eminii* moderately resistant; *Manilkara cuneifolia*, *Brachystegia spiciformis* and *B. microphylla* impermeable; *Acacia albida* permeable (vessel penetration).

2453. DIETRICHS, H.-H., and SANDERMANN, W. Studien auf dem Gebiete der Holzschutzchemie—achte Mitteilung: Papierchromatographie und Analyse von Holzschutzmitteln. **[Studies in the field of wood preservation chemistry. VIII. Paper chromatography and the analysis of wood preservatives.]** *Holz Roh- u. Werkstoff* 16 (9), 1958 (340–6). 37 refs. [G.g.e.] P.R.

2454. BURO, A. Beitrag zum Nachweis von öligen Schutzmitteln im Holz. **[The detection of oily preservatives in wood.]** *Holz Roh- u. Werkstoff* 15 (10), 1957 (437–43). 8 refs. [G.g.e.] P.R.

Working on the hypothesis that oils would make the cells moisture-repellent, a procedure was developed for detecting oils by using a mixture of H_2SO_4 (to expose and decompose the cellulose) and iodine water (to stain the cellulose) as a reagent. Tests on 33 oily commercial products showed that 31 could be detected in wood, even after some of the test pieces had been stored for 3 years. Details of the preparation, testing, reliability and possibilities of the reagent are discussed.

2455. SWEENEY, T. R., PRICE, T. R., and MILLER, S. M. **Coal-tar creosote studies. II. An evaluation of certain fractions for their resistance to marine borer attack.** *Corrosion, Houston* 14, 1958 (348*t*–350*t*). From *abstr.* in *Chem. Abstr.* 52 (17), 1958 (14945). P.R.

Tests were made with Pine panels to determine both initial borer resistance and long-term protective ability of creosote fractions and of whole creosote. The removal of tar acids gave a superior product, which even after leaching appeared to be as good as whole creosote. The beneficial effect of removing tar acids is shown also in the petrol-ether-soluble portion with acids removed, which left the wood clean and attractive after impregnation. The removal of the tar bases, and both bases and acids, gave products that performed somewhat better than creosote before, but not after, leaching. Creosote with the distillation residue removed gave a poor performance, possibly owing to the effect of the residue on the retention of creosote in the wood. One of the distillation fractions gave a superior product.

2456. REUSSE, W., and ZAUBITZER, R. Die quantitative Bestimmung des Chrom- und Arsengehaltes getränkter Masten durch Aktivierungsanalyse. **[The quantitative determination of the chromium and arsenic content of impregnated poles by activation analysis.]** *Holz Roh- u. Werkstoff* 16 (8), 1958 (307–10). 2 refs. [G.g.e.] P.R.

[Cf. *F.A.* 17 No. 928.] Samples of treated and untreated wood and of the preservative are activated by irradiation in atomic piles and a Geiger counter is used to determine the half-life value and radiation energy of Cr^{51} and As^{76}. A standard deviation of $\pm 4\%$ and maximum variations of $\pm 12\%$ are considered sufficiently accurate for many purposes.

2457. JONAS, G.-Z. Auslaugbarkeit und Fixierung von U- and UA-Schutzsalzen im Holz. **[Leaching and fixing of U and UA salts in wood.]** *Holz Roh- u. Werkstoff* 15 (10), 1957 (418–23). 6 refs. [G.g.e.] P.R.

Discusses methods of accelerating the fixing of U and UA salts, and experiments which showed the fixation of UA salts to be greater than that of U salts.

2458. ALLGEMEINE HOLZIMPRÄGNIERUNG DR. WOLMAN G.m.b.H. **Improvements in or relating to wood preserving agents.** *Brit. Patent* No. 796,871, 1958. pp. 6 + 1 gph. Price 3*s.* 6*d.* P.R.

The broadest form of the preservative comprises 2 gram atoms of hexavalent Cr in the form of alkali-metal salts of H_2CrO_4 or $H_2Cr_2O_7$ or in the form of H_2CrO_4, 6 *m* mols of alkali-metal fluoride and/or *n* mols of alkali arsenate wherein $m + n = 2$, and from 0·2 to 1·2 times as much of H equivalents in the form of acids—other than H_3AsO_4—as are required by theory to neutralize the alkali liberated from the composition during the reduction of the hexavalent

Cr by substances present in the wood, to achieve the maximum rate of Cr fixation in the form of compounds, not readily soluble, of fluoride and arsenate.

2459. WATSON, C. C. **The contamination of bacon by arsenic from smoke derived from preservatized wood.** *N.Z. J. Sci.* 1 (3), 1958 (361–8). 6 refs. P.R.

Bacon cured for 5 hours in a pilot plant with smoke from sawdust of sapwood of *Pinus radiata* treated with Boliden S-25 preservative, contained 1·3–2·3 p.p.m. As, which had penetrated to a depth of 3 cm. from the exposed meat surface, but only negligibly from the skin surface.

2460. WATSON, C. C. **The contamination of fish by arsenic from smoke derived from preservatized wood.** *N.Z. J. Sci.* 1 (3), 1958 (369–72). 1 ref. P.R.

Fish was smoked, as an experiment, using shavings from *Pinus radiata* treated with Boliden S-25 as the source of smoke. During burning, 22% of the As in the wood shavings was volatilized, and uptake of As in the fish was as high as 25 p.p.m.

2461. KÖRTING, A. Weitere Untersuchungen über die Fluorbestimmung im Holz als Bewertungsmöglichkeit von Holzschutzmassnahmen. [**Further investigations on the determination of fluorine in wood as a possible way of evaluating preservative treatments.**] *Holz Roh- u. Werkstoff* 15 (10), 1957 (432–6). 7 refs. [G.g.e.] P.R.

Further investigations [cf. F.A. 19 No. 2416] on the decrease of F in wood treated with (*a*) a BF, and (*b*) an SF salt. With (*a*) F losses did not, but with (*b*) did, continue during 3–3½ years' storage. Quantitative measurements of the depth of penetration of F (BF salt) into the wood showed that ca. 50% of the quantity retained was in the outer ½-cm. layer.

2462. MCGREGOR, G. **Immunisation of veneer with sodium fluoride solution.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 11 (1/2), 1958 (12–4). 1 ref.

The law requires the immunization of *Lyctus*-susceptible sapwood by approved preservatives and plant. Borates (admissible) preclude the use of phenol-formaldehyde glues. A process is recommended using NaF, 10 lb./100 gal. water, to which is added 0·5 lb. Na trichlorophenate (active against moulds in acid media). Where this fungicide stains pale timbers (notably *Schizomeria ovata*) in alkaline conditions, 6–8 oz. of 60% acetic acid can be added. Veneers are bulk-stacked wet, for diffusion. Methods of sampling and testing for absorption are detailed.

2463. DEPEW, H. A., and WAITKINS, G. R. (to American Zinc, Lead & Smelting Co.). **Wood preservation.** *U.S. Patent* No. 2,838,424, 1958. From *abstr.* in *Chem. Abstr.* 52 (17), 1958 (14956). P.R.

Methods are given for depositing an insoluble Zn salt on the walls of the pores of wood. The treated wood is fire-resistant, toxic to fungi and to termites, repellent to marine borers, non-hygroscopic, machinable and paintable. An example of a treatment is described.

2464. KOUKAL, M. Příspěvek k toxicitě pentachlorfenolátu sodného. [**On the toxicity of Na PCP.**] *Drev. Výskum* 3 (1), 1958 (73–98 + 2 plates). 9 refs. [Cz.cz.russ.g.e.] P.R.

Experiments carried out to determine the necessary toxic concentration [total inhibition point?] of Na PCP against moulds (*Monilia*, *Aspergillus*, *Cladosporium*, and *Trichoderma* spp.) on steamed Beech, showed that for small dimensions (e.g. parquet blocks) 0·5% suffices, but sleepers etc. need 2%. Tests showed that the amount of leaching depends more on the wood species than on solution concentration. In Beech impregnated with 5% concentration of Na PCP, only 30% of the chemical was fixed because of the low acidity of the wood. Leaching, even of 1% concentrations, does not reduce chemical strength below the toxic level.

2465. CHARISIUS [K.], and THEDEN, G. **Testing of diethyloctyl tin acetate for its protective effect against termites.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 4044, [1958]. pp. 3 + 2 tbls. Transl. by M. Slade from *Prüfungszeugnis, Bundesanstalt für Materialprüfung* No. 2, parts 1–5, *Aktenzeichen* 2.4/55 38 *B*, 1957. Limited distribution.

Blocks of *Pinus sylvestris*, impregnated by vacuum treatment with solutions of the preservative or of heavy coal-tar oil in $CHCl_3$, and untreated controls were exposed to *Calotermes flavicollis* and to *Reticulitermes lucifugus*. A 1% solution (7–8 kg./cu.m. wood) gave effective protection, slightly reduced by leaching, volatilization and long storage, but an 0·1% solution was insufficient; heavy coal-tar oil proved less toxic. The 1% solution had a repellent effect against *R. lucifugus*, blocks (unlike those treated with coal-tar oil or the controls) remaining clean and ungnawed after 4 weeks of leaching and 12 weeks of volatilization in the wind tunnel.

2466. ZABEL, R. A., and MOORE, R. A. **Relative effectiveness of several oil-soluble wood preservatives. Condition of dip-treated stake and boardwalk assemblies, exposed one year to decay and termite attack.** *For. Prod. J.* 8 (9), 1958 (258–63). 15 refs.

A first report on a field test with preservatives previously tested for penetration [cf. *F.A.* 18 No. 4681]. Two dip treatments (15 sec. and 10 min.) and two pressure treatments (with a light and a heavy oil as solvent) were evaluated on *Pinus ponderosa* sapwood at Gainsville and Syracuse. Boards slightly raised above the soil, whether treated or not, and pressure-treated stakes, showed no damage, but many of the dip-treated specimens and most of the controls failed completely in contact with the ground. Degree of decay was similar in both places, with more white rot at Gainsville and more brown rot at Syracuse. 2% Cu naphthenate, 5% PCP and 7·5% rosin amine D PCP gave best protection, the first-named heading the list at Gainsville and the second at Syracuse, and 5% Zn alkyl sulphonate at the bottom in both places; 1% Cu napthenate and 1% Cu 8-quinolinolate were intermediate. Termite attack was of minor importance.

2467. [**Incising Japanese Cedar poles.**] *Wood Ind., Tokyo* 12 (12), 1957 (14–7). 4 refs. [Jap.e.] P.R.

[Cf. *F.A.* 20 No. 1142.] Investigations showed that distances between incisions should be ca. 1·5 cm. ⊥ and ca. 50 cm. ∥. Incisions did not impair the bending strength of creosoted poles, and somewhat accelerated air seasoning. *From author's summary.*

2468. Novák, J. Odstranění ronění oleje z impregnovaného dřeva. [**Eliminating bleeding of impregnated wood.**] *Drev. Výskum* 3 (1), 1958 (99–114). 16 refs. [Cz.cz.russ.g.e.] P.R.

Examines literature on the bleeding of creosoted wood exposed to sunshine, and describes a method of eliminating the trouble. After creosoting, the poles are impregnated with a 2–3% solution of NaOH in water, under pressure at 80° C. for 60–75 min. The method can be applied to poles treated by the Rueping and Bethel processes.

2469. Göhre, K. Versuche zur Imprägnierung von Kiefernkernholz mit Teeröl. [**Impregnating Pine heartwood with creosote.**] *Holz Roh- u. Werkstoff* 16 (1), 1958 (22–7). 4 refs. [G.g.e.] P.R.

Tests made on different series of samples ranging from heartwood blocks 4 × 14 × 30 cm. to sleepers containing a high % of heartwood achieved satisfactory impregnation by pressure treatment after heating the wood, with a moisture content of 12% during treatment, to a final temperature of ≮ 100° C., between platens of a hot press or by high frequency; pieces with larger cross-sections tended to split if final temperatures exceeded 110°, while smaller pieces gave satisfactory results at temperatures of 140°, but creosote uptake at temperatures > 160° was less satisfactory. Late wood was thoroughly impregnated and early wood usually sufficiently so. Tests with *Lentinus lepideus* showed that the wood was adequately protected. Pine bolts, 2 m. long, with heartwood attacked by *Trametes pini* were successfully impregnated by the Rüping process, with a period of 2 hours under pressure.

2470. Gerlachov, T. Kritériá vlhkosti pri impregnácii bukových podvalov. [**Moisture-content criteria in impregnating Beech sleepers.**] *Drev. Výskum* 3 (1), 1958 (49–61 + 1 plate). 7 refs. [Slovak.slovak.russ.g.e.] P.R.

Examines the importance of the m.c. of sleepers when using the double Rueping process, for which maximum limits of m.c. for satisfactory impregnation are established.

2471. Hochfrequenz-Tiefimprägnierung. [**High-frequency deep impregnation.**] *Holz-Zbl.* 84 (126), 1958 (1613). [G.]

Describes a German patent using HF for heating wood (especially hardwood) in a bath of preservative oil, thereby evaporating the moisture in the wood while creating a strong internal pressure, so that on subsequent cooling a vacuum is formed which rapidly sucks the heated oil into the wood, penetrating the heartwood. Repeated (pulsating) heating and cooling shortens the impregnation period. For economy in time and energy consumption, wavelengths < 15 cm. are best. In a test run, a 10 × 10 × 70-cm. block weighing 2·5 kg. and subjected 3 times for 3 minutes to a 5-KW field, absorbed 3 kg. of preservative. Various methods of creating the HF field are described. [Cf. *F.A.* 13 No. 4361.]

2472. Rubeš, V. Příspěvek k impregnaci dřeva difusí-osmosou. [**Impregnating wood by diffusion-osmosis.**] *Drev. Výskum* 3 (1), 1958 (63–71 + 1 plate). [Cz.cz.russ.g.e.] P.R.

Gives the results of tests on the rate of diffusion into Beech of $BaCl_2$, (*a*) in solution under pressure with hydraulic pumps, and (*b*) as a water paste introduced via axially drilled holes. The rate of diffusion was found from X-ray photographs of the test pieces taken at various times after the treatment; it varied from 0·5 to 0·12 mm./day.

2473. Bavendamm, W., and Willeitner, H. Beiträge zur Holzschutztechnik—Vierte Mitteilung: Praxisnahe Untersuchungen über die Imprägnierung von Bauholz durch Bohrlochtränkung. [**Wood protection techniques—Report 4. Investigations, in conditions similar to practice, on the preservation of building timber [*in situ*] by soaking via drilled holes.**] *Holz Roh- u. Werkstoff* 15 (10), 1957 (411–6). 8 refs. [G.g.e.] P.R.

[Cf. *F.A.* 16 No. 2340.] Test pieces of *Pinus sylvestris* and *Picea abies*, 10 × 10 × 70–80 cm., of mean m.c. 19–20%, were used. In all, 1000 holes 10 mm. in diam. were drilled, either vertically or at 45° to the fibre direction, and filled with two tar-based preservatives or four different water-soluble salt solutions. The uptake of preservative by the wood, and the depth of penetration, were examined, and the differences between species and between sapwood and heartwood discussed. It was found that impregnation by this method was better than by dipping, spraying, painting etc. Boreholes should be 16 mm. in diam. and ≮ 15–20 cm. apart in the fibre direction, and ≮ 3–4 cm. apart vertical to it. If several rows of boreholes are drilled they should be staggered, and wood subject to tensile stresses should not be bored.

2474. Wälchli, O. Bericht über die Versuche des VSE zur Prüfung von Stangen-Imprägnierungen. 5. Mitteilung. [**Report on investigations by the VSE [Verband Schweizerischer Elektrizitätswerke] on testing pole impregnation.**] *Energie-Erzeugung und -Verteilung, Zürich* 5 (13), 1958 (121–9). 9 refs. [G.g.f.] P.R.

Summarizes the results in 1957 of various trials begun in 1952 of treatments to protect poles against Cu-resistant fungi, and includes summaries of results already published as progress reports. Satisfactory results were obtained from: (1) after-treatment of standing poles treated originally with $CuSO_4$, using mixtures of salts applied by injection or bandage treatment; (2) butt treatment, before use, with salt mixtures (especially when applied by injection) of poles first treated with $CuSO_4$; (3) a single treatment with UA salts applied by the 'trough-suction' method [cf. *F.A.* 19 No. 2421], pressure creosoting and possibly Wolmanit UA-Reform by the Boucherie process.

2475. El tratamiento antiséptico de las apeas para mina y su aspecto económico. [**Preservative**

treatment of mining timbers and its economic aspects.] *Montes, Madrid* 14 (82), 1958 (327–32). [Span.]

Presents data on costs in Spain with some information on a pilot plant planned by the Instituto Forestal, Madrid.

2476. **Standard N.W.M.A. methods for testing the preservative property of oil-soluble wood preservatives by using wood specimens uniformly impregnated.** National Woodwork Manufacturers' Association, U.S.A. *NWMA–M–1–53*, 1953. pp. 14. P.R.

Describes in detail two methods, one used to determine the total inhibition points of a preservative on a test fungus and the other to determine whether the preservative at 15% of its use concentration will inhibit the growth of decay fungi and so meet the N.W.M. Association's standards of efficacy.

2477. DUNCAN, C. G. **Studies of the methodology of soil-block testing.** *Rep. U.S. For. Prod. Lab., Madison* No. 2114, 1958. pp. 126. 13 refs. P.R.

Presents the tabulated results of 6 years' study on various aspects of the soil-block method, with some supporting data from other sources. The main aspects covered include: toluene as a diluent for testing oil-type preservatives; effect of species of wood on preservative threshold values obtained; effect of aeration; representativeness of the preservative-tolerance of standard isolates of *Lentinus lepideus*, *Lenzites trabea* and *Poria monticola*; development of a weathering phase in the tests; and differences among test fungi other than those normally used.

2478. GERSONDE, M., and BECKER, G. Prüfung von Holzschutzmitteln für den Hochbau auf Wirksamkeit gegen Pilze an praxisgemässen Holzproben ('Schwammkeller'—Versuche). **[Tests on wood preservatives, used in building, for their activity against fungi in conditions similar to those in practice ('fungus-cellar' studies).]** *Holz Roh- u. Werkstoff* 16 (9), 1958 (346–57). 15 refs. [G.g.e.] P.R.

In the method used, model floors measuring 85 × 50 cm., of alternating strips of 4 treated and 4 untreated boards of Pine or Spruce, were set up on untreated underfloor beams, and covered with glass to represent an air-tight floor covering. The models were set up in a dark cellar, and kept at a temperature of 20–22° C. and a relative air humidity of 90%. The underfloor beams were inoculated with *Merulius lacrymans*, *Coniophora cerebella* or *Poria vaillantii*; the tests lasted 5 months for the first, and 4 months for the other two fungi. Results are given in tables and in photographs showing the spread of the mycelium in the different tests. The progress of the attack and the differences between the two tree species are discussed. Threshold values for $MgSiF_6$ applied by brushing were tested by the cellar method (4–8 weeks) or the standard Kolle-flask method. The values obtained were respectively 13–15 g. and 2–3 g./sq. cm. wood surface with *M. lacrymans* and 18–20 and 3–6 g. with *C. cerebella*. The importance of large-scale practical tests is stressed.

842. Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire

2479. PATSCHEKE, G., and DILG, K. Untersuchungen über Herstellung und Reaktionsfähigkeit von Inklusionshölzern. **[Researches on the preparation and reactivity of 'inclusion' [topochemically modified] woods.]** *Arch. Forstw.* 7 (3), 1958 (203–19). 34 refs. [G.g.russ.e.]

[Cf. *F.A.* 18 No. 4578.] Discusses the topochemistry of wood (i.e. the chemical alteration of the substance whilst maintaining its structure) as affected by the fine structure and sub-microscopic pore system of the cell-wall. Recent work on the acetylation of cellulose is quoted to illustrate an important topochemical reaction of the cell-wall network, namely that all the cellulose will come under reaction only if the pore system is protected from collapse, e.g. by the introduction in an indifferent solvent of other molecules ('*Inklusionscellulosen*'). In fibre cellulose and pulps, the incrustation and cementing hemicelluloses, pectins and lignin of the cell-wall promote reactivity by maintaining the pore system, but hinder it in sealing off otherwise reacting material from an additional solvent inclusion. Data are given on the acetylation of ground wood of *Tilia* sp. to show that the cementing substances in this case keep open all the reactive material to acetylation and that scarcely any increase of acetylation is effected by the inclusion of benzene. In the case of wood it must be remembered that both the cellulose scaffolding (fibrils) as well as the cementing substances of the cell are acetylated.

2480. RISI, J., and ARSENEAU, D. F. **Dimensional stabilization of wood. Part V. Phthaloylation.** *For. Prod. J.* 8 (9), 1958 (252–5). 12 refs.

In this, the final study of the series [cf. *F.A.* 19 Nos. 2431–2], the effect of treating time, concentration, and reaction temperature on stabilization with phthalic anhydride was investigated (*a*) with dimethyl phthalate as a solvent, pyridine and zinc as acylating catalysts and *Picea mariana* as sample, and (*b*) with dimethyl formamide as a solvent, and *Abies balsamea* as sample, (*b*) proving superior. Phthaloylation imparted the greatest degree of stabilization yet observed, but it was partially affected by leaching. The chief difficulty encountered in this series of investigations was degradation of the wood in varying degrees, caused partly by HCl or pyridine hydrochloride formed as a side reaction. Sometimes this difficulty could be overcome by etherification.

2481. GOTO, T., ARAKI, M., and KADITA, S. **[Studies on the dimensional stabilization of wood. 1. On the β-napht[h]ylamine-impregnated wood.]** *J. Jap. Wood Res. Soc.* 4 (4), 1958 (131–3). [Jap.e.*e.*] P.R.

Chamaecyparis obtusa and *Betula nikoensis* heartwood specimens (50 × 10 × 5 mm.) were immersed in β-naphthylamine at 130° C. for 1 hr., and some were then dipped in acetone solvent at room temperature for 2, 30 or 80 min. to remove the excess. Several different drying and soaking treatments were then used, and the sp. gr., equilibrium m.c.,

water absorption rate and dimensions measured. It was found that β-naphthylamine treatment reduced the hygroscopicity and increased both the dimensional stability and sp. gr. of the wood.

2482. LLOYD, R. A., and STAMM, A. J. **Effect of resin treatment and compression upon the weathering properties of veneer laminates.** *For. Prod. J.* 8 (8), 1958 (230–5). 6 refs.

Reports on accelerated and natural weathering tests on twenty-six 5-ply panels, involving 6 hardwood and 5 softwood species, cross banding or laminating (i.e. all parallel grain), 4 degrees of pressure, and precuring the treating resin (water-soluble phenol-formaldehyde) within the plies (impreg) vs. curing in the press while bonding (compreg) vs. no resin treatment. In general, impreg was better for hardwoods and compreg for softwoods, while both weathered better than controls.

2483. HUHRJANSKAJA, T. P. Deformacija uvlažnennoj drevesiny berezy, sognutoj po torcu i pressovannoj po konturu. **[Deformation of moistened Birch wood, end-grain-bent, and contour-pressed.]** *Derev. Prom.* 6 (10), 1957 (21–2). 3 refs. [Russ. russ.] P.R.

The equilibrium moisture content (e.m.c.) of Birch-wood bushes made by (*a*) end-grain bending and (*b*) contour-pressing [cf. *F.A.* 20 Nos. 1085–6] was determined for humidities of 1 to 100%, and compared with that of natural Birch wood (*c*). It was found that if bushes (*a*) and (*b*) were dried at ⩾ 100° C. in manufacture, it was possible to determined their e.m.c. by the use of N. N. Čulickij's curves for (*c*). The dimensions and shape of (*a*) bushes held in steel cramps in water and emulsion, underwent virtually no change, but (*b*) bushes under the same conditions swelled significantly in thickness. The e.m.c. of (*a*) bushes used under ordinary working conditions (e.g. for conveyor-belt rollers) must be less than the m.c. of their surroundings, and (*b*) bushes must be dried out to a m.c. equal to the e.m.c. for their surroundings in any given set of working conditions.

2484. OGARKOVA, T. V. Koėfficient usuški pressovannoj berezy. **[The coefficient of shrinkage of compressed Birch.]** *Derev. Prom.* 7 (5), 1958 (17–8). 1 ref. [Russ.russ.] P.R.

In statistically designed and evaluated experiments on (1) natural wood, (2) wood compressed radially, and (3) contour-pressed wood [cf. *F.A.* 20 No. 1086], it was found that in (2) the coefficient of shrinkage (c.s.) in the direction of compression increases linearly with the degree of compression. At the optimum degree of compression (75–100%) the c.s. of (2) is 3 times that of (1), but the c.s. at right angles to the direction of compression remains the same as in (1). With (3), the c.s. is roughly the same both radially and tangentially [at any degree of compression]. With the 100% compression it is twice that of (1) in the radial direction, and 1·5 times tangentially.

2485. HUHRJANSKAJA, T. P. Opredelenie ob″emnogo vesa i tverdosti drevesiny, gnutoj po torcu. **[Determining the density and hardness of end-grain-bent wood.]** *Derev. Prom.* 7 (7), 1958 (17–8). [Russ.russ.] P.R.

A study was made of the density and hardness of the lateral surfaces of Birch and Aspen wood end-grain-bent [cf. *F.A.* 20 No. 1085] into bushes. Both qualities change with the thickness of the bushes, by the hyperbolic law, i.e. their max. values are in the inner layers of the bushes. Therefore, in finishing these bushes on a lathe, only a very thin layer should be removed from the inner (bearing) surface, so as to retain the strongest part of the wood. The relation between (*a*) the lateral and (*b*) the end-grain (bearing surface) hardness and the density is shown by graph.

2486. ŽITKOV, P. N., and OGARKOV, B. I. Pressovanno-gnutaja drevesina i ee primenenie v proizvodstve. **[Pressed-and-bent wood and its uses.]** *Derev. Prom.* 7 (10), 1958 (14). [Russ.] P.R.

Pressed-and-bent wood is made by steaming the wood for 1–2 hr., then pressing it radially into ordinary moulds to a density of 0·8–1 g./c.c. The wood is then dried in the mould at 80–120° C. until it can be lifted out freely. It is then cut into thin sheets which are heated for 15–20 min. to 80–90° and bent in a hand-clamp to make semi-cylinders. These are dried in the clamp and can then be glued together in pairs to make bushes. Figures for compression ‖ in kg./sq. cm. are: contour-pressed wood 885; bent-and-pressed wood 625; wood radially compressed 1100; and pressed-and-bent wood 1631. Bushes of pressed-and-bent wood can be made for only 9% of the cost of bronze bushes. In the front end roller of a belt conveyor, the wooden bushes lasted 12 months, bronze ones 6, and cast-iron ones 2. Wooden bushes as bearings for the shaft of a cotton gin have a working life of 18 months.

2487. KLAR, G. V. Primenenie pressovannoj drevesiny. **[The use of compressed wood.]** *Lesn. Hoz.* 11 (2), 1958 (73). [Russ.]

Farm trials with trailed ploughs and cultivators have shown that bearings of 'contour-pressed' Aspen are more resistant to wear than cast-iron bearings and also cause less wear of the steel journals. They cost only ½–⅓ as much to produce. Compressed wooden bearings and washers have also been used in rollers and pumps with considerable success.

843. Fireproofing and Fire Resistance

See No. 2279.

844. Attack by Plant Organisms

844.1. Sap-staining and Mould Fungi

See also Nos. 2294, 2462, 2535.

2488. ROLDAN, E. F. **Modes of infection of unscraped rattan poles by the staining fungus, *Ceratostomella* sp.** *For. Leaves, Philippines* 10 (3), 1958 (21–4, 26).

Results of the study indicate that the stain fungus enters and infects rattan readily via cut ends, injuries, and nodes, and by direct penetration of unbroken rinds of the internodes. Infections

through the nodes and uninjured rind, however, take longer to develop than those through unprotected cut ends and injured rind.

2489. SIRUNO, F. S. **The effect on the growth of staining fungus of the soluble extracts from unsplit Palasan (*Calamus maximus* Merr.) after submerging in swift running water.** *Philipp. J. For.* 11 (1/2), 1955 (1956), (79–85 + 4 photos). 4 refs.

Diplodia sp. was cultured on extracts from canes that had been submerged in running water for 2–12 weeks. Fungal growth decreased with increasing submergence period but still appeared on extracts from canes submerged for as long as 12 weeks.

2490. SAGRADO, M. J. **Effect of submerging unscraped Palasan (*Calamus maximus* Blanco) in swift running water on the occurrence of fungal stains.** *Philipp. J. For.* 11 (1/2), 1955 (1956), (163–9 + 1 photo). 4 refs.

Canes submerged for 10–12 weeks and then dried were ca. 90% free from stain, and the remainder were only lightly infected.

844.2. Wood-destroying Fungi

See also Nos. 1900, 1998 *et seq.*, 2234, 2294, 2343–4, 2349, 2466, 2477–8, 2535–7.

2491. SAVORY, J. G., and PINION, L. C. **Chemical aspects of decay of Beech wood by *Chaetomium globosum*.** *Holzforschung, Berlin* 12 (4), 1958 (99–103). 23 refs. [E.e.g.] P.R.

Chemical analyses of wood exposed for up to 27 weeks to *C. globosum* showed that cellulose and pentosans are more readily attacked than lignin, and that a considerable % of the lignin still remains when the decomposition of the cellulose and pentosans is nearly complete. There are general indications that the fungus may be able to decompose lignin only when associated carbohydrates are also attacked, but that relatively little attack of the heavily lignified compound middle lamella occurs. The solubility of Beech in 1% NaOH solution is slightly reduced by *C. globosum*. These analyses show that the soft-rot fungi, as typified by *C. globosum*, differ markedly from basidiomycetes in their effect on the wood constituents and must be considered as a group chemically as well as biologically separate from the white- and brown-rot fungi.

2492. RYČKOVA, A. G. O himičeskom sostave gniloj drevesiny berezy i osiny. **[The chemical composition of decayed Birch and Aspen wood.]** *Ž. prikl. Him.* 31 (2), 1958 (265–73). 21 refs. [Russ.russ.] L.S.

In Birch and Aspen the relative cellulose content was higher in wood with white rot (caused by *Fomes fomentarius* in Birch, *F. igniarius* in Aspen) than in healthy wood, whereas it was lower in wood with brown rot (from *Polyporus betulinus* in Birch and *F. pinicola* in Aspen). The amount of hot-water extractives was 2–3 times higher for both types of rot, and that of ethanol extractives somewhat lower, than for healthy wood. Data are also given on the lignin composition, acids from dry distillation, and total sugar content, for both rotted and healthy wood.

2493. FÅHREUS, G., TULLANDER, V., and LJUNGGREN, H. **Production of high laccase yields in cultures of fungi.** *Physiol. Plant., Copenhagen* 11 (3), 1958 (631–43). 28 refs. [E.e.]

Test fungi were *Stereum hirsutum*, *S. purpureum*, *Polyporus abietinus*, *P. hirsutus*, *P. zonatus*, *P. versicolor*, and *Marasmius graminum*.

2494. BERNIER, B. **The production of polysaccharides by fungi active in the decomposition of wood and forest litter.** *Canad. J. Microbiol.* 4 (3), 1958 (195–204 + 1 plate). 20 refs. O.R.S.

Four fungi [*Pullularia pullulans*, *Lenzites betulina*, *Polystictus versicolor*, and *Marasmius dryophilus*] known to be active in the decomposition of wood or of forest litter were grown on a liquid medium containing salts and glucose, and also on aqueous extracts of a variety of fresh leaves and litter. The polysaccharides produced in the various culture media by the same organism were found by chromatography of the hydrolysates to be of the same composition. In some cases, when the fungi were grown on leaf or litter extracts, polysaccharide synthesis did not take place because of lack of carbohydrate material; in many instances it was inhibited by a factor or factors present even in much diluted extracts. *From author's summary.*

2495. BAKSHI, B. K., SINGH, B., and PURI, Y. N. **Occurrence of *Polyporus leucospongia* in India.** *Canad. J. Bot.* 36 (3), 1958 (363–5 + 1 plate). 4 refs. O.R.S.

P. leucospongia, a wood-rotting fungus so far observed only in montane and subalpine zones in N. America, is found to occur commonly in the W. Himalaya of India in temperate regions of > 6000 ft. alt., on stumps and logs of *Cedrus deodara*, *Picea morinda* and *Abies pindrow*. The fungus is described.

2496. DILLER, J. D., and KOCH, E. J. **Weight loss of wood exposed to *Merulius lacrimans* under four environmental conditions.** *Abstr.* in *Phytopathology* 48 (8), 1958 (461).

After 24 months' storage, weight losses of 468 test blocks, comprising heartwood, sapwood and heart- + sapwood specimens of 13 species, averaged 11·1% in the crawl space of an occupied house in Beltsville, Md., 8·9% under a mound of leaves in a wooded area, 7·4% in an abandoned root cellar, and only 3·7% in a room at a controlled temperature of 40° F.

2497. SCHULZ, G. Versuche zur Frage der natürlichen Pilzfestigkeit von nordischen und deutschen Kiefernsplint- und -kernholz. **[Investigations on the natural decay resistance of sapwood and heartwood of Scandinavian and German Pine.]** *Holz Roh- u. Werkstoff* 15 (10), 1957 (401–5). 5 refs. [G.g.e.] P.R.

Mycological investigations revealed the sapwood (s.w.) adjoining the heartwood (h.w.) to be much more damaged than the latter by *Lenzites abietina*, *Poria vaporaria* and *Merulius lacrymans*. *L. lepideus* caused almost as much damage to h.w. as to s.w., and *Coniophora cerebella* more. Results showed no significant difference in decay resistance between

the two races of *Pinus sylvestris*, for either s.w. or h.w., and the resistance varied only insignificantly within the 3 s.w. and 3 h.w. zones sampled (outer, central and inner). Scandinavian Pine s.w. took up less creosote than the German.

2498. WAZNY, J. Studien über die Einwirkungen von *Merulius lacrymans* Wulf. Fr. und *Coniophora cerebella* Pers. auf die mechanischen Eigenschaften befallenen Holzes. **[The effect of *M. lacrymans* and *C. cerebella* on the mechanical properties of wood.]** *Holz Roh- u. Werkstoff* 16 (8), 1958 (285–8). 3 refs. [G.g.e.] P.R.

Decrease in strength as a result of fungus attack was greatest in impact bending strength followed in order by static bending strength, compression strength and Janka hardness. Hardness was equally affected by both fungi, other properties were more affected by *C. cerebella*. Strength properties of Oak and of Pine heartwood were least affected by fungus attack; Pine sapwood, Spruce and Beech were less resistant. *From author's summary.*

2499. Les ennemis des bois dans la construction et l'ameublement. **[Pests of timber used in building and furnishing.]** *Cah. Centre tech. Bois* No. 31, 1958. pp. 19. [F.] P.R.

Part 1 deals with fungi (*Merulius lacrymans*, *Coniophora cerebella* and *Phellinus megaloporus*), Part 2 with insects (*Hylotrupes bajulus*, *Hesperophanes cinereus*, *Sirex* spp., *Lyctus* spp., Anobiidae and termites), giving information on damage and on control measures.

2500. GERSONDE, M. Untersuchungen über die Giftempfindlichkeit verschiedener Stämme von Pilzarten der Gattungen *Coniophora*, *Poria*, *Merulius* und *Lentinus*. I. *Coniophora cerebella* (Pers.) Duby. II. *Poria vaporaria* Fr. und *Poria vaillantii* (D.C.) Fr. **[Studies on the susceptibility to poison of strains of *Coniophora*, *Poria*, *Merulius* and *Lentinus* spp. I. *C. cerebella*. II. *P. vaporaria* and *P. vaillantii*.]** *Holzforschung*, *Berlin* 12 (1; 3; 4), 1958 (11–9; 73–83; 104–14). 48 + 28 refs. [G.g.e.] P.R.

[Cf. *F.A.* 20 No. 1161.] (I) The resistance of 7 cultures to 4 water-borne and 3 water-insoluble preservatives was tested by the Kolle-flask method. Results are tabulated. The cultures proved most susceptible to Na arsenate (1) and to $HgCl_2$ (2) and least susceptible to α-chloronaphthalene and coal-tar creosote (3). Cultures differed considerably in their resistance, especially to (1), (2), (3) and PCP (4). The amount of preservative required to control the most resistant strains would have to be increased, compared with that required for the standard strain, by at least 5 times for (1) and (2), 4 times for (4) and 3 times for (3). (II) Considerable differences in appearance and growth of surface mycelium and in intensity of attack were found between 4 strains of *P. vaporaria*, but only comparatively small differences between three strains of *P. vaillantii*. In general, the *Poria* strains were most susceptible to NaF and $MgSiF_6$, followed in order by $HgCl_2$, Na arsenate, PCP, α-chloronaphthalene and coal-tar creosote. *P. vaporaria* showed particularly wide variations in the susceptibility of various strains to PCP, $MgSiF_6$ and α-chloronaphthalene; strains of *P. vaillantii* showed comparatively little variation in susceptibility. Limiting values (separating continuance of attack from its total inhibition) for the F compounds are 4 times, and for creosote 3 times, those for the standard strain of *P. vaporaria*, to ensure protection against all *Poria* strains.

2501. LUTHARDT, W. **Treatment of wood ['Mykoholz'].** *German Patent* No. 946,845, 1956. From *abstr.* in *Chem. Abstr.* 52 (17), 1958 (15068–9). P.R.

[Cf. *F.A.* 18 No. 4703.] The wood is inoculated with a wood-destroying fungus and exposed to its action for periods from 14 days to several months, preferably with an interruption for air-drying. It can be further disintegrated by chemical means or it can be impregnated.

845. Attack by Animals

845.1. Marine Borers

See also No. 2455.

2502. NAIR, N. B., and LEIVESTAD, H. **Effect of low temperature on the vertical distribution of two wood-boring crustaceans [*Limnoria lignorum* and *Chelura terebrans*].** *Nature, Lond.* 182 (4638), 1958 (814–5). 4 refs.

2503. SHIINO, S. M. **The marine wood-boring crustaceans of Japan. II. (Sphaeromidae and Cheluridae).** *Wasmann Journal of Biology, San Francisco* 15 (2), 1957 (161–97). 41 refs. O.R.S.

[Cf. *F.A.* 13 No. 1650.] Describes *Sphaeroma sieboldii*, *S. retolaevis*, *Cymodoce japonica*, *Exosphaeroma ovata* and *Chelura brevicauda*, with some information on their ecology and location in Japan, and gives some examples of damage done by *Sphaeroma* spp. and of wood species attacked.

2504. MCCOY-HILL, M. **Forest Department/East African railways and harbours combined marine borer research project.** *Emp. For. Rev.* 37 (3), 1958 (320–6).

Lists the resistance rating of 29 local timbers to attack by marine borers—Teredinidae, Pholadidae, *Limnoria*. The effect of various preventive treatments is described, treatments with Dieldrex [dieldrin type] or Cu salts being the most promising. The author considers it uneconomic to import expensive timbers when treated local species e.g. *Chlorophora excelsa*, *Manilkara cuneifolia* and *Podocarpus* spp. will give equal service.

2505. RICHARDS, A. P. **Anti-fouling marine coatings for use over pressure creosoted wood.** *For. Prod. J.* 8 (8), 1958 (240–1).

Navy standard paint 16X, on a coal-tar basis, imparted a high resistance to fouling to (*a*) creosoted and (*b*) untreated test panels of Douglas Fir and Southern Yellow Pine for 12 months, and was consistently superior to a copper-bronze sealing paint for 24 months. At that time (*a*) were generally in a better condition than (*b*), the superiority decreasing with increasing creosote retentions. Unpainted (*a*) showed localized attacks of *Limnoria*, and painted (*b*) Pine numerous *Bankia*, while

painted (*a*) were free from borers after 40 months; unpainted (*b*) controls were completely destroyed after 6 months.

845.2. Terrestrial Borers

See also Nos. 2103, 2462, 2499, 2536.

2506. DOMINIK, J. Z obserwacji nad biologią zapobieganiem szkodom i zwalczaniem *Ernobius mollis* L. (Col. Anobiidae). **[Some observations on the biology, prevention of damage and control of *E. mollis*.]** *Sylwan* 102 (3), 1958 (61–5). 1 ref. [Pol.russ.e.]

Describes mating, and larval damage. Coating infested wood with a solution of camphor in alcohol was ineffective, but 100% kill of larvae was obtained when the infested wood was immersed for 24 hours in a 4% NaF solution; this also prevented re-infestation.

2507. SANTORO, F. H. Anobido destructor de una colección de maderas (*Xyletinus brasiliensis* var. *argentina* Pic.). **[An anobiid destroying a wood collection (*X. brasiliensis* var. *argentina*).]** *Rev. Invest. for., B. Aires* 1 (4), 1957 (29–33 + 1 plate). 3 refs. [Span.]

Lists species attacked in the wood collection of the Facultad de Agronomía y Veterinaria de Buenos Aires.

2508. FRANCIA, F. C., and GARCIA, M. L. **The economic significance, habits and control of powder-post beetles ('bukbok') injurious to seasoned wood and forest products.** *Repr.* from *Lumberman, Philippines* 4 (2), 1958 (6, 8–10). 19 refs. P.R.

An account of Bostrychidae and Lyctidae causing damage in the Philippines, with recommended control measures.

2509. SARAIVA, A. COUTINHO. Combate ao *Hylotrupes bajulus* (L.) em bairros urbanos. **[Control of *H. bajulus* in urban districts.]** *Memória, Laboratório Nacional de Engenharia Civil, Ministério das Obras Públicas, Lisboa* No. 106, 1957. pp. 17. [Port.port.f.e.] P.R.

Discusses the three usual types of control, i.e. heat treatment, fumigation and the use of liquid insecticides, presents the results of laboratory tests of some commercial insecticides used in Portugal, and summarizes the results of a study tour in France and Germany. Liquid insecticides are the only safe substances for use in inhabited buildings. For roofing structures and foundations, tar-oil derivatives and compounds with an acid fluoride base may be used. In inhabited quarters it is safer to limit the choice to such products as the silico-fluorides. Some practical recommendations are given. *From author's summary.*

2510. TECHNAU, G., and BEHRENZ, W. Erfahrungen in der Zucht von *Hylotrupes bajulus* L. **[Breeding *H. bajulus*.]** *Holz Roh- u. Werkstoff* 16 (3), 1958 (90–4). 12 refs. [G.g.e.] P.R.

Discusses the results of 10 years' experience at the wood-preservation laboratory of the Farbenfabrik Bayer. Cold treatment to induce pupation was found necessary. Egg laying was increased if the fertilized ♀'s were exposed to an Osram ultravitalux lamp. The mechanical stimulus of rough wood surfaces in cracks, rather than smell, seemed to be the determining factor for egg laying. Eggs were laid on Alder in preference to Pine.

2511. SCHMIDT, H., and SCHNEIDER, A. Abtötende und vorbeugende Wirkung bei der Hausbockbekämpfung mit Heissluft. **[The lethal and preventive effect of hot-air-treatment on *Hylotrupes bajulus*.]** *Holz Roh- u. Werkstoff* 15 (10), 1957 (406–10). 7 refs. [G.g.e.] P.R.

Danish success in controlling the pest by the hot-air method prompted experiments in Germany that showed the best lethal temperatures in practice to be 54–55° C. The rate of temperature rise in wood and its effect on the beetle are examined. Further tests indicated that attack can also be prevented by treating wood with hot air.

2512. KIRKPATRICK, T. W., and SIMMONDS, N. W. **Bamboo borers and the moon.** *Trop. Agriculture, Trin.* 35 (4), 1958 (299–301). 4 refs.

[Cf. *F.A.* 8 p. 196.] Internodes, taken from the top, middle and bottom of mature (5- to 10-year) and immature culms of *Bambusa vulgaris*, felled, some during the waxing, others during the waning of the moon, were placed in a greenhouse with pieces heavily infested with *Dinoderus minutus*. Tables show infestation in number of holes per 100 sq. in. of surface after 63 and 97 days. Popular local rhyming statements that (*a*) 'Bamboo cut with moon on wane will ensure financial gain', (*b*) 'But beetles bore it very soon, if cut upon the waxing moon', and (*c*) 'Moreover it's a well-known fact that ripe bamboo is less attacked' are disproved by the data, which show a non-significant advantage for (*b*) and a highly significant ($P < 0{\cdot}001$) disadvantage for (*c*), i.e. 'the lunar myth is utter tripe, and borers *like* their bamboo ripe'.

845.3. Termites

See also Nos. 2344–7, 2465–6, 2499.

2513. BENITO MARTINEZ, J. Los termes en España—biología, daños y métodos para combatir la especie subterránea *Reticulitermes lucifugus*. **[Termites in Spain—biology of the subterranean *R. lucifugus*, damage caused, and methods of control.]** [*Publ.*] *Serv. Plagas for., Madrid* No. 6*B* (2nd ed., rev.) 1958. pp. 29. [Span.]

2514. RIBEIRO, S. F. PEREIRA. Breves notas sobre uma termita subterranea *Reticulitermes lucifugus* Rossi. **[Short notes on a subterranean termite, *R. lucifugus*.]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 91–C3, 1958. pp. 33 + 8 tbls., 2 sets of drawings, 1 map, 5 photos. 35 refs. [Port.] Limited distribution.

Notes on biology, ecology, foci of infestation in Lisbon, methods of control, repellents, and protective treatment of wood.

2515. WOLCOTT, G. N. **One-percent pentachlorophenol protects wood against dry-wood termite attack for more than 11 years.** *Journal of Agriculture, University of Puerto Rico, Río Piedras* 40 (1), 1956 (85–6). 1 ref. I.M.I.

Bursera simaruba, impregnated with 0·2% PCP, was attacked by *Cryptotermes brevis* after 13 days; 0·5% PCP kept termites at bay for 273 days; the 1% sample had a surface excavation after 337 days, but this was not enlarged until > 11 years from the date of impregnation.

845.4. Other Animals

2516. SCHMIDT, H. Ameisenschäden im lagernden Holz. **[Damage by ants to stored timber.]** *Holz-Zbl.* 84 (102), 1958 (1297). [G.]

Describes and illustrates some cases in which *Lasius niger* attacked softwood timber, including *Sequoia gigantea*. The ants build nests in the wood but do not feed on it. Control by a liquid insecticide giving off poisonous vapour is suggested.

2517. JORGENSEN, R. N., PFITZENMEYER, H. T., and BRAMBLE, W. C. **Prevention of woodpecker damage to wooden utility poles.** *Progr. Rep. Pa. agric. Exp. Sta.* No. 173, 1957. pp. 4. 7 refs. C.G.B.

The most severe damage by *Dryocopus pileatus* occurs in the winter, and no damage at all was observed in June–Aug. Trials of various methods of prevention, and observations of the bird's behaviour in the wild and in captivity, indicated that several mechanical repellents (e.g. the use of aluminium sheets) gave satisfactory protection, but were impracticable for other reasons. Some chemical repellents that can be combined with preservatives proved successful in the aviary and are to be tested in the field as soon as possible.

847. Drying (Seasoning)

See also Nos. 2290, 2405, 2415, 2450.

2518. **List of publications on the seasoning of wood.** *Rep. U.S. For. Prod. Lab., Madison* No. 446, 1958. pp. 21. P.R.

All are N. American, mainly from the Laboratory itself.

2519. KOTOK, E. S. **Weather records as guides to air-drying lumber.** *Res. Note Intermt. For. Range Exp. Sta.* No. 56, 1958. pp. 3.

Graphs are presented showing for 8 locations in the Rocky Mt. region the relationship of air temperature and humidity to the moisture content of stacked lumber.

2520. TERAZAWA, S., and KODAMA, S. **Fundamental study on the operation of wood drying. III. A simplified estimation of drying time in kiln-drying.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3786, 1958. pp. 10 + 6 gphs. 10 refs. Transl. by A. S. Clifton from *Bull. For. Exp. Sta. Meguro, Tokyo* No. 97, 1957 (61–72), (parts 4–6 only). [See *F.A.* 19 No. 1115.] Limited distribution.

2521. KEER, G. A. **Kiln drying and control of the drying rate.** *Wood* 23 (11), 1958 (470–1).

Outlines the principles of moisture movement in the wood and factors affecting evaporation in kiln drying. The possibilities for controlling the drying rate are indicated and the effect of timber characteristics (e.g. hardwood or softwood, sapwood or heartwood, slow- or fast-grown) on the drying rate are briefly discussed.

2522. KÜBLER, H. Die Befeuchtung von Psychrometern in Trockenanlagen. **[Keeping kiln psychrometers wet.]** *Holz Roh- u. Werkstoff* 16 (5), 1958 (160–5). 9 refs. [G.g.e.] P.R.

Describes, with illustrations, various methods of keeping a sleeve constantly moist, including constructions with ceramic sleeves.

2523. RIJSDIJK, J. F. Het kunstmatig drogen van hout. **[Kiln seasoning of wood.]** *Repr.* from *Houtwereld, Netherlands* Jan. 4th, Feb. 1st, March 15th, 1958. pp. [4]. [Du.]

Gives illustrations showing the drier, with recording instruments, used at the Houtinstituut T.N.O., and graphs illustrating the effect of air humidity and air speed on drying time.

2524. LAMBE, T. A. **Dry kilns for small operations.** *B.C. Lumberm.* 42 (10), 1958 (46, 48).

Notes on a direct-fired natural-gas and a low-pressure boiler radiator type, in popular commercial use in the Western U.S.A.

2525. MABESA, E. O., and MABESA, C. **Construction of an experimental dryer and artificial drying of rattan.** *Philipp. J. For.* 11 (1/2), 1955 (1956), (9–27 + 4 photos, 1 dgm.). 9 refs.

Describes, with scale plans, costs etc., a kiln capable of drying 150 canes (mean diam. 1 in., length 3 m.), with drying schedules.

2526. MILOVIDOV, S. G. Prižim pilomaterialov pri suške. **[Clamping [stacked] sawn timber to prevent working during drying.]** *Derev. Prom.* 7 (6), 1958 (22). [Russ.] P.R.

A description of the clamping system, which utilizes the weight of the timber itself to prevent working of the upper courses of the stack, the floor, as it sinks with the weight, actuating a system of levers and cables that transmits the downward pressure to the upper courses.

2527. SMIRDIN, P. M. O režime suški grabovyh zagotovok. **[Notes on a drying schedule for sawn Hornbeam.]** *Derev. Prom.* 7 (8), 1958 (16). [Russ.] P.R.

The textile industry in the U.S.S.R. uses considerable amounts of Hornbeam for spools, shuttles etc., and demands high standards of quality of the kiln-dried wood. Accordingly, tests were made by CNIIMašdetal' [Central Research Institute for Textile Equipment] on drying samples of Hornbeam 45 × 55 × 370 mm., using 4 different drying schedules. Details of the schedules themselves, but not of the results, are given; the best schedule is indicated.

2528. RICHARDS, D. R. **High temperature drying of southern hardwoods.** *Circ. Ala. agric. Exp. Sta.* No. 123, 1958. pp. 12. P.R.

Various southern hardwoods were dried from green at 110° C. One-inch lumber of Yellow Poplar [*Liriodendron tulipifera*], Beech, Blackgum [*Nyssa sylvatica*], Hickory and Sapgum [sapwood of *Liquidambar styraciflua*] could be dried from 60% to 4% m.c. in ≤ 24 hours without excessive degrade. Hygroscopicity of the wood was noticeably increased by the treatment. Some improvement in

dimensional stability was observed, but only erratically, probably because of abnormal swelling associated with release of mild collapse that had occurred during drying. The case-hardening that occurred should be easy to prevent, e.g. by intermittent or final steaming. Controlled air-seasoning to ca. 30% m.c. before high-temperature treatment is recommended to prevent collapse. Redgum [heartwood of *L. styraciflua*], Red Oak and White Oak showed severe internal checking and are unsuitable for high-temperature drying.

2529. **Drying studies.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1956/57*, 1957 (88).

Observations were continued on the behaviour of 5 Australian sleeper timbers given pressure preservative treatment (*a*) after vapour-drying, (*b*) after air-drying, and (*c*) while green. After exposure for periods up to 17 months, surface and end splitting were least on (*a*) material. Within a species, drying *in situ* has been inversely proportional to the amount of preservative absorbed.

2530. VODOZ, J. Das Verhalten des Holzes während der Trocknung im hochfrequenten Wechselfeld. **[Behaviour of wood during high-frequency drying.]** *Holz Roh- u. Werkstoff* 15 (8), 1957 (327–40). 56 refs. [G.g.e.] P.R.

Describes experiments on the effect of wood structure and orientation, using a method allowing the calculation of the heating rate from measurements of temperature, weight loss, and internal steam pressures. This method, in contrast to methods based on dielectric constants, is said to be applicable to wood of any initial moisture content. Sample cubes of Beech, Oak, Maple and Silver Fir heartwood were tested. Heat absorption in an axially or radially directed field increases rapidly with higher initial m.c.'s., but less so in a tangential field, the difference being greater for Oak than for the diffuse-porous species. In the subsequent drying phase, permeable species behaved similarly, but Oak, red heart of Beech, and also Fir were influenced by an inner diffusion resistance causing increased vapour pressures, attributed in Oak and Beech to tyloses.

2531. VODOZ, J. **Seasoning by high frequency (R.F.) current.** *Timb. Technol.* 66 (2233), 1958 (535–8).

The distribution of water in wood, the disadvantages of natural and conventional artificial drying methods, and the principles of HF seasoning are discussed. An industrial HF drying installation is described: a conveyor carries the wood into a drying tunnel where it passes between an earthed electrode and several high-potential electrodes at various distances from the wood. The moisture released from the wood is removed by air currents provided by a fan. The system can be used with hardwoods and softwoods, both native and exotic, and the drying process takes 2–4 hours, irrespective of the initial m.c. Cost of drying varies with the wood m.c., but a general estimate is that it takes ca. 1·1 KWH to evaporate 1 litre of water. Advantages of the system are: absence of corrosion on equipment, the possibility of drying thick pieces without degrade and internal stresses, the uniform m.c. achieved, the speed of drying, automatic and continuous operation, and no necessity for skilled labour.

2532. LAURSEN, S. B., and BOYE, C. Orientering om omkostningerne ved anvendelse af højfrekvens til opvarmning og samtidig bøjning af massive, mindre træemner. **[Preliminary calculations of costs of high-frequency heating and simultaneous bending of small, solid wood blanks.]** *Træindustrien* 8 (3), 1958 (47–9). [Dan.] P.R.

In the method concerned, the material is placed in a form, heated by high frequency and bent to shape while moisture is given off; after bending is completed, heating is continued until the wood reaches the required moisture content. The equipment used is briefly described, and calculations are made of the energy and temperatures needed for bending and drying, and of the cost. Beech, $1\frac{1}{4} \times 2 \times 34$ in., can be bent and dried from 40 to 10% m.c. in $2\frac{1}{2}$ min., at a cost of Kr.0·52 per piece, and from 20 to 10% m.c. in just over 1 minute at Kr.0·22 per piece: both include amortization, current and wages.

2533. **Collapse and recovery.** *Rep. For. Prod. Aust. 1957/1958*, 1958 (19).

A correlation between collapse and wood maturity in *Eucalyptus regnans* was established. Collapse in heartwood of top logs was $\frac{1}{2}$ that in that of butt logs, and collapse in sapwood $\frac{1}{3}$ of that in adjacent heartwood. Significant sapwood collapse occurred only in butt logs. Reconditioning reduced these differences. Steaming green *E. regnans* for 6 hours reduced air- and kiln-drying times by about 25% without impairing colour or size after reconditioning; steaming for 12–48 hours further reduced drying time, markedly increased collapse and its permanence, and darkened colour. A second, delayed reconditioning was valuable in removing collapse caused by reconditioning at too high a moisture content. Pretreatment with 12% NaCl or 0·01% HCl reduced gross shrinkage in Israeli-grown immature *E. rostrata* by 17 and 8% of green wood volume respectively, but steam reconditioning proved more successful than either in removing collapse. NaCl appears to act both as an anti-shrink agent and a collapse inhibitor.

848. Timberyard Practice. Handling and Storage of Timber

See also Nos. 1867, 2294, 2489–90.

2534. SOINÉ, H. Das Fördern schwacher Rundholzsortimente. **[Transporting small logs.]** *Holz Roh- u. Werkstoff* 15 (5), 1957 (220–8). [G.g.e.] P.R.

A survey of recent W. German developments in transport and mechanical handling equipment (conveyors, cranes, fork-lifts etc.) and their application in timber yards, factories, docks and elsewhere.

2535. ISAACSON, F. H. **New water fog spray method reduces log losses in storage.** *Wood, Chicago* 63 (1), 1958 (25–6, 60, 62). P.R.

Points out the serious losses from decay, checks and stain in logs stored in the summer, the disadvantages of pond storage, and the advantages of continuous spraying, making recommendations on spraying techniques for U.S. conditions.

2536. **[Deterioration of stored Pine pulpwood.]** *Rep. Sth. For. Exp. Sta. 1957*, 1958 (15–7; 25–6).

Decay and beetle damage in stored pulpwood, causing loss of specific gravity, were prevented by water storage, and were considerably reduced by spraying with 5% $NH_4F{\cdot}HF$ and 5% NaF. In other trials, comparing insecticides alone, fungicides alone, or both, dips in a solution of 2 lb. γBHC and 10½ lb. Na PCP in 50 gal. water, gave considerable protection for 3–6 months. Better still, though much dearer, was 2 lb. γBHC and 2% PCP in fuel oil.

2537. TOKER, R. Memleket şartlarına göre kayında ardaklanmayı önleme denemeleri 1954–1955. **[Experiments in preventing decay in Beech logs under Turkish conditions, 1954–55.]** *Zir. Vek. Orm. umum Müd. tek. Bült.* No. 6, 1956. pp. 66 + 1 map, 10 photos, 5 drawings. 29 + 16 refs. [Turk. turk.g.e.*g.*]

Logs harvested in winter and in summer were given various treatments (e.g. barking, squaring), the cut surfaces being painted with lime, $CuSO_4$ or creosote, and then left either in the forest or in the storage depot. Decay generally occurred earlier at the latter, and creosote appeared a better preventive than $CuSO_4$ or lime.

2538. FINIGHAN, R. **Reducing end splitting in logs and poles. The use of end coatings.** *For. Prod. Newslett. C.S.I.R.O. Aust.* No. 245, 1958 (1–2).

Forty 32-ft. logs of *Eucalyptus regnans*, felled ca. 2 days before, were cross-cut to 16-ft. lengths and treated with a variety of end coatings, matched cross-cut ends remaining untreated as controls. Heavy petroleum grease and wax mixtures, brush or paddle-applied (and one available as a spray) best met the various requirements sought from such coatings. Where heavy loads are applied on the cut end and under possibly high temperatures, e.g. in mining timbers, these coatings may become dangerously slippery, and a bituminous type is more suitable.

85. Grading of Wood and Wood Products

851. Timber Quality in General

See Nos. 2203, 2275, 2350 *et seq.*, 2417.

852. Detection, Recognition and Assessment of Injuries and Defects

See also Nos. 1921, 2272–4, 2305–6, 2308, 2355–6, 2533, 2566.

2539. KLOOT, N. H., and SCHUSTER, K. B. **The effects of gum veins and pockets on the bending properties of Jarrah scantlings.** *Div. For. Prod. technol. Pap. For. Prod. Aust.* No. 2, 1958. pp. 8. 3 refs. P.R.

Static-bending tests were made on 88 green Jarrah scantlings of nominal 4 × 2-in. section to determine the effect of gum veins and pockets. The results indicate that, within the range of defect sizes examined, both types of defect cause a reduction in bending strength and stiffness. The effect of gum veins on both properties is substantially greater than has hitherto been assumed. *Authors' summary.*

2540. IACONIS, C. L. Corazón rojo o falso corazón del quebracho blanco. **[Red heart or false heart of *Aspidosperma quebracho-blanco*.]** *Rev. Invest. for., B. Aires* 1 (4), 1957 (39–45 + 4 plates). 13 refs. [Span.span.]

Describes the macro- and microscopic characteristics of false heart of *A. quebracho-blanco*. A fungus was isolated from affected wood and is described, though not named.

2541. SUZUKI, R. **[The measurement of roughness of cut surfaces by drops of water. 1.]** *J. Jap. Wood Res. Soc.* 4 (4), 1958 (156–61). 12 refs. [Jap.e.*e.*] P.R.

Investigates the relationship between the roughness of several sorts of cut surfaces (different wood species sawn in different ways), the contact angle of a drop of water on them, and the 'tumbling angle' (i.e. the angle of inclination of the cut surface at which the drops of water begin to flow down). Results are graphed. [Cf. *F.A.* 17 No. 2191.]

2542. EHLERS, W. Über die Bestimmung der Güte von Holzoberflächen. **[Determining the quality of wood surfaces.]** *Holz Roh- u. Werkstoff* 16 (2), 1958 (49–60). 55 refs. [G.g.e.] P.R.

[Cf. *F.A.* 17 No. 2190.] Tests were made using the Leitz surface recorder, designed by Forster in 1944, and comprising a needle moved by an impulse mechanism (electrical or mechanical), with an arrangement of mirrors and lenses allowing a point of light representing the height of the needle movement to be transferred to a film for photographic recording. Repetition of the tests on the same surface showed that the profiles obtained were in good agreement with each other. The recorder could be used without damage to the surface, and needles with a radius down to 60μ gave good results, without surface damage. The effect of different needle radii in relation to e.g. wood structure is discussed. Some examples are given of the profiles obtained from different species, recorded ∥ and ⊥, after different treatments, e.g. circular and band sawing, planing etc.

853. Grading of Wood in the Rough

See also Nos. 2154–5, 2210, 2226.

2543. **Log grade studies in the Ponderosa Pine region. Lumber grade recovery from Douglas Fir, Western Larch and White Fir at Halfway, Oregon.** *Bull. Ore. For. Prod. Res. Cent* No. 7, 1958. pp. 24.

2544. KING, W. W. **Evaluating quality of Black Walnut sawlogs.** *For. Prod. J.* 8 (9), 1958 (243–8). 12 refs.

A study based on > 500 logs in a Kentucky sawmill, relating output of lumber by thickness and grade to diameter and log grade, and discussing assessments of log values.

2545. WALLIN, W. B. **The influence and importance of defects and log grades on lumber grade yield from Aspen logs.** *Abstr. of thesis*, in *Dissert. Abstr.* 18 (4), 1958 (1193). O.R.S.

Eight-foot Aspen logs varying in diameter from 6 to 16 in. were selected to include all types of defects, and graded by both the Lake States Forest Experiment Station and the Forest Products Laboratory log-grade rules, neither of which was found satisfactory for differentiating them in terms of quality. After external characteristics had been recorded, the logs were sawn into 6/4 [1½-in.] timber which was graded by National Hardwood Association rules, and finally converted into crating material. Quality index values were determined for each log, employing price relatives for Basswood. The logs were ranked numerically by quality index in descending order and divided into 3 quality classes, with index ranges of 85–144%, 45–90% and 0–55%. External characteristics were then analysed for each quality class, and log grades defined in terms of diameter, size of clear area on the surface, and permissible decay, the analysis having shown that these criteria served best to describe the logs included in each of the defined grades. The defined log-grades were also found to serve as a measure of the value of the log for crating use.

854. Grading of Converted Timber

See Nos. 2226, 2424–6, 2544.

2546. HUDDLESTON, E. B. **The grading of Monterey Pine [*Pinus radiata*].** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 11 (1/2), 1958 (7–8). 1 ref.

[Cf. *F.A.* 18 No. 1117.] Outlines the history of grading this timber in Australia and New Zealand and describes the present co-operation in New South Wales between the Standards Association, who publish rules, the Forestry Commission, who have graders and inspect graded timber in service as opportunity offers, and the Monterey Pine Inspection Association, who license and assign numbers to graders, such numbers being one of the grading marks. This Association also guarantees to buyers the difference in price for parcels graded too high. Moisture meter, grain detector (for spiral grain) and rule are the grader's equipment.

86. Pulp Industries. Composite Materials made Wholly or Partly of Woody Matter. Chemical Utilization of Wood

861. Pulp and Paper Manufacture. Textile and Other Cellulose Derivatives

See also Nos. 2156–8, 2229, 2236, 2269–70, 2536, 2660, 2673.

2547. **[Pulp and Paper Research Institute of Canada.]** *Pulp Paper Mag. Can.* 59 (10), 1958 (289–304).

Reports the opening of the new buildings at Pointe Claire, Montreal, constructed and equipped by the Canadian government for $2,250,000, and reviews the development and work in fundamental research of the Institute, which is run jointly by the government, McGill University and the industry, whose members contribute through a cess levied on annual production. Details of the directorate, advisory panel, staff, finance and equipment are given.

2548. **Research in Canada.** *Pulp Paper Mag. Can.* 59 (10), 1958 (305–34).

Reviews the contributions to pulp and paper research in Canada made by 12 industrial companies, one national and 2 provincial research councils, 4 universities, the Forest Products Laboratory, Ottawa, and the Pulp and Paper Research Institute.

2549. KEAYS, J. L. **Growth of pulp and paper technology in the Soviet Union [1950–58].** *Pulp Paper Mag. Can.* 59 (8), 1958 (104–6, 155–64). 353 refs.

Includes, after a general note, a detailed review of the work of the Central Pulp and Paper Research Institute; the Kirov Academy of Wood Technology and 13 other institutes; contributions from 22 mills; and work in allied fields, with numbered references to the papers concerned and with authors' names and page references to Vols. 25 to 33 (1950–58) of *Bumažnaja Promyślennost'*, in which they are contained.

2550. **Pulp and paper prospects in Latin America.** FAO, Rome. 1955. pp. 465.

In two parts: Part I—Report of the Latin American (L.A.) meeting of experts on the pulp and paper industry held in Buenos Aires, 1954; and Part II—Working papers submitted to the meeting. The papers cover a wide range of subjects connected with pulp and paper consumption, production and trade in L.A., the use of L.A. resources for pulp and paper production, and technical and economic aspects of the L.A. industry. Of particular interest to foresters are (1) papers on subtropical hardwoods as a source of pulp and paper, with specific data on the pulping properties of certain species, including: Preliminary results on the pulping of some Brazilian tropical and subtropical hardwoods (*L. Rys*, *A. Boenisch*, *W. Overbeck* and *A. Schwarz*) and Pulping of Peruvian Cetico [*Cecropia* sp.] for the manufacture of newsprint; and (2) papers on other L.A. forest resources for pulp and paper manufacture, which include reports on Eucalypts, Salicaceae and exotic conifers.

2551. Papel y celulosa. **[Paper and cellulose.]** *Bol. argent. for.* 15 (153), 1957 (9–13). 1 ref. [Span.]

A detailed review of Argentina's requirements in paper and pulp, and the cost and methods of meeting them with the least resort to foreign exchange. The wood equivalents (in thousands of cu.m., solid u.b.), estimated for 1967 are for: (*a*) chemical pulp, 225 conifers and 50 hardwoods; (*b*) semi-chemical and (*c*) mechanical, 680 and 330 (hardwoods) respectively; a total of 1285. Most of the conifers of (*a*) should come from forests and plantations of *Araucaria angustifolia* in Misiones (expected annual yield 150,000 cu.m.) plus thinnings from the annual planting of 4000 ha. of *Pinus taeda* and *P. elliottii* projected for the Delta. The Delta plantations of Willows and Poplars will meet the (*b*) and (*c*) requirements. The balance could be made up by imports

(e.g. in newsprint from Chile) and by augmenting the available supplies of agricultural residues (e.g. by substituting oil fuel for bagasse in sugar factories).

2552. KOCH, R. O., SAPP, J. E,, and MCCRAY, R. L. **Kraft pulping of Spruce Pine.** *Tappi* 41 (7), 1958 (349–53). P.R.

Experiments on *Pinus glabra* as a pulp source showed that, in comparison with Southern Pine, its fibre length was ca. ⅔ as long, and its pulping characteristics and yields were very similar. *P. glabra* pulps, at a given freeness, will produce a denser sheet, having a higher bursting and a lower tearing strength than pulps of Southern Pine. At the same apparent density, the strength of pulps and their bleaching characteristics are about the same.

2553. SAMUELS, R. M., and GLENNIE, D. W. **Bark tolerance of Douglas-Fir chips in kraft pulp manufacture.** *Tappi* 41 (5), 1958 (250–5). 23 refs. P.R.

Cooks from a log of 83-year Douglas contained 0, 5, 10 and 20% bark by weight. Bark quantity had no effect on pulp strength, but yield and cleanliness decreased, and consumption of chemicals increased, with increasing bark content. Chips containing 5% bark produced pulp no higher in dirt content than the bark-free control, but the low yield reduced the calculated market value to ca. 93% of that of bark-free chips. Chips containing 10% bark had high dirt content as well as low yield, but centrifugal cleaning of the pulp gave cleanliness nearly equal to the control; the calculated market value was ca. 82% of that of bark-free chips. Chips containing 20% bark had a calculated market value ca. 68% of that of bark-free chips, and acceptable cleanliness could not be obtained with centrifugal cleaning.

2554. **Third international fundamental research symposium: Properties of hardwoods and their relation to pulp and paper manufacture [sponsored by the Canadian Pulp & Paper Association and TAPPI, Montreal, Sept. 1958].** *Pulp Paper Mag. Can.* 59 (10), 1958 (173 . . . 287). 482 refs.

Reports 14 papers covering the importance of hardwoods for pulp; their distribution and availability in N. America; genetical improvement; growth mechanisms, morphology of fibres; interfibre bonds in the hot stock pressure refining for neutral sulphite semi-chemical (NSSC) pulp of *Betula* spp.; penetration and diffusion into hardwoods; carbohydrates of hardwoods and softwoods compared; polysaccharides of White Birch and other hardwoods; chemistry of hardwood lignins; hardwood resin; hardwood extractives and their relation to other wood components; groundwood and chemi-groundwood from European Poplars; and strength of bleach sulphate and NSSC pulps of mixed Red and White Oaks.

2555. MAY, M. N. **Pulping possibilities of certain Southern bottomland hardwoods.** *Proc. 7th For. Symp. La. Sch. For.* 1958 (77–89). 3 refs.

Gives data on pulping properties of *Quercus falcata*, *Q. alba* and *Q. marilandica* (all ring-porous), and *Liquidambar styraciflua*, *Nyssa sylvatica* and *Acer* sp. (all diffuse-porous), with Southern Pine for comparison.

2556. JAYME, G., and SEMMLER, H. **Production of tannin and pulp from young Black Locust wood.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3872, 1958. pp. 6. 5 refs. Transl. by M. Slade from *Papier, Darmstadt* 11 (17/18), 1957 (396–8). Limited distribution.

Wood of *Robinia pseudoacacia* 9–10 years old showed a high oven-dry density (0·75 g./c.c.) and thick-walled cells, with an average fibre length of 0·71 mm. Strength values of sulphate pulp obtained (e.g. breaking lengths of 9200 and 7720 m., folding strengths of 3300 and 1600 for unbleached and bleached pulps respectively after beating) were higher than was expected from the wood properties. The content of very short cell elements (< 0·1 mm.) was 43% by number or 10% by weight. The cellulose content ranged from 41·6% at the top of the stem to 43·7% at the bottom. The mean yield of bleached sulphate pulp, based on the non-extracted wood was 50·1%. The butt wood contained only 1·5% and the whole bark only 1·6% of tanning material, and extraction for tannins would be uneconomic. Pulp with promising strength properties was produced by the NSSC [neutral sulphite semi-chemical] process.

2557. TENESCU, S. Comparaison des celluloses de hêtre et de charme destinées à la papeterie. **[Comparison of the cellulose of *Fagus sylvatica* and *Carpinus betulus* for paper-making.]** *Rev. Bois Appl.* 13 (9/10), 1958 (48–50). [F.]

The comparison included the structure of the wood of the two species, behaviour during treatment by the bisulphite process, and the chemical, bleaching and physical characteristics of the pulps.

2558. ISTAS, J. R. Recherches sur l'utilisation en papeterie des essences tropicales et du papyrus. **[Studies on the use of tropical species and papyrus for paper-making.]** *Repr.* from *Bulletin, Association Technique de l'Industrie Papetière, Paris* 1958 (1). pp. 18. [F.f.] P.R.

Presents tabulated results of chemical and morphological examinations and of various pulping experiments on raw materials from the Belgian Congo. Although papyrus could be pulped satisfactorily, yields were too low for commercial use. Pulps from individual hardwood species were, with few exceptions, inferior to that from *Pinus sylvestris*; pulps of mixed species had qualities similar but slightly inferior to that of *P. sylvestris*. Bamboos are not at present available in sufficient quantities, but more could be planted. The dwarf Bamboos (*Sasa paniculata*, *S. variabilis*, *Arundinaria nitida* and *A. simonii*) are unsuitable for pulping (short, fine, stiff fibres); the larger species examined (fibre length 2·7 mm.) gave promising results, especially *Bambusa vulgaris*.

2559. GHOSH, S. S., and RAO, K. R. **Anatomical studies on indigenous hardwoods with special reference to their suitability for pulp and paper.** *Repr.* from *Cellulose Research: a symposium.* Council of

Scientific and Industrial Research, New Delhi. 1958. pp. 71–82. 13 refs.

Factors affecting the suitability of a species for pulping are discussed. They include: sp. gr.; colour; amount of extractives and resin canals; amount, distribution, size and shape of fibres and tracheids; cell-wall structure; amount and distribution of parenchyma; size and distribution of vessels; tyloses and other inclusions; and reaction wood. A tentative list of some Indian hardwoods suitable for pulping, with their characteristics, is given.

2560. LAUER, K. **A study of tropical woods. I. Chemical and fiber characteristics of some tropical woods. II. The influence of beating conditions on sheet properties. III. Sulphate pulping of some tropical woods from the Amazon. IV. Comparison of sulphate pulps from mixed tropical woods with industrial kraft pulps from southern hardwoods. V. High-yield pulps from tropical hardwoods.** *Tappi* 41 (7), 1958 (334–44). 10 refs. P.R.

(I) Tabulates the pulping, chemical and morphological characteristics of *Qualea dinizii*, *Lucuma dissepala*, *Protium heptaphyllum*, *Cecropia juranyana* and *Palmeira assai*. (II) Trials showed that, for sulphate pulps made from tropical hardwoods, application of a lower beater load is an advantage. (III) Digestion experiments with the species mentioned in (I) resulted in pulps of specific properties. A certain influence of fibre structure, especially the wall thickness/fibre diam. ratio, was observed, but neither the sp. gr. nor the chemical composition of the wood gave any indication of pulp quality. (IV) Sulphate pulps from mixtures of tropical hardwoods showed comparable breaking length and bursting strength to kraft pulps of southern [U.S.A.] hardwoods, with and without Pine, but lower tear and fold. (V) Neutral sulphite and sulphate cooking liquors were used with *L. dissepala*, *C. juranyana*, and with a mixture of 8 species. High-yield pulps obtained with alkali digestion had better qualities than NSSC pulps, but the latter gave higher yield and brightness. The qualities of unbleached tropical-hardwood pulps from *C. juranyana* and the mixture of 8 species correspond to high-yield pulps from Ash, Maple or Eucalypts; those of high-yield bleached tropical pulps correspond to medium-quality temperate high-yield hardwood pulps.

2561. CHIDESTER, G. H., and SCHAFER, E. R. **Pulping and papermaking experiments on Colombian woods.** *Rep. U.S. For. Prod. Lab., Madison* No. 2117, 1958. pp. 17 + 13 tbls. 9 refs. P.R.

Tabulated data are given on the wood structure of 31 broadleaved Colombian species, and on the papers and boards made from various species-blends of pulp by the groundwood, NSSC, cold soda, and sulphate methods of pulping. Results generally showed that the quality of the products was in most respects comparable to that of papers and boards made in the U.S.A. from home-grown pulpwood.

2562. ALMONTE, B. D. **Preliminary study on the possibility of using Ipil-Ipil (*Leucaena glauca* (L.) Benth.) for paper pulp by the semichemical process with soda in open vessel.** *Philipp. J. For.* 11 (1/2), 1955 (1956), (135–61). 12 refs.

Pulp yields of 70·6–81·8% were obtained from Ipil-Ipil of different ages under different conditions. Mean fibre length was found to be 1·18 mm.

2563. ESTEVES, H. D. **Preliminary studies on the pulping of Tangile (*Shorea polysperma* (Blanco) Merr.), Mayapis (*Shorea squamata*, (Turcz.) Dyer) and Bagtikan (*Parashorea plicata* Brandis) using variable concentrations of sodium hydroxide and time element.** *Philipp. J. For.* 11 (1/2), 1955 (1956), (67–77). 13 refs.

2564. KOEPPEN, A. VON. **Pulping studies on *Eucalyptus deglupta* Bl., *Bruguiera parviflora* Wight. and Arn., *Avicennia marina* (Forsk.) Vierh.** *Tappi* 41 (8), 1958 (460–4). 24 refs. P.R.

In further work [cf. *F.A.* 16 No. 4755] butt samples of *E. deglupta* and *B. parviflora*, and logs of *A. marina* were used for sulphate pulping, and morphological and chemical investigations. Results, detailed in tables and graphs, indicate that pulp of good yield can be obtained from all three species, the over-all strengths of *E. deglupta* and *A. marina* pulps being similar to those of commercial *E. regnans* pulps.

2565. CENTOLA, G. **Use of *Eucalyptus* in chemical pulp preparation.** British Paper & Board Industry Research Association, Kenley, Surrey. 1958. pp. 5. 26 refs. Abridged translation by E. A. M. Thompson from *Industria della Carta, Milano* 11 (10), 1957 (119). Limited distribution.

Summarizes literature, under the headings: chemical and morphological constitution; mechanical pulp; semichemical pulps; sulphite and sulphate pulps; and pulps for chemical uses.

2566. **Pulping of compression wood.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1956/57*, 1957 (86).

[Cf. *F.A.* 19 No. 3603.] Both sulphate and sulphite pulps prepared from compression wood (c.w.) of *Pinus radiata* were inferior in yield and strength to those made from normal wood (n.w.) of the same species. However, the c.w. pulped satisfactorily under the same conditions as required for n.w. when the sulphate process was used, and the reduction in strength, due to c.w. pulp, was not considered serious, even when 50/50 blends of such pulp with commercial pulp of the same species were tested. On the other hand, the sulphite process was unsuitable, mainly because of the association of 'acid-susceptible' wood with the compression wood. In such wood numerous minute compression failures are present and these give rise to 'broken fibres' on acid pulping.

2567. ROBB, G. A. **Nuclear steam plants for the pulp and paper industry.** *Pulp Paper Mag. Can.* 59 (9), 1958 (121–8).

Outlines the present stage of development in various types of reactor, with illustrations, and cites a pulp and paper company generating process steam at Halden, Norway, from a nuclear-fission reactor in summer 1958.

2568. **Third international mechanical pulping conference [sponsored by C.P.P.A. and TAPPI,**

Quebec, Sept. 1958]. *Pulp Paper Mag. Can.* 59 (10), 1958 (105 . . . 172). 34 refs.

Reports 13 papers covering: the development of groundwood pulping; a new method of grinding; effects of stone surface/wood angle; pulp quality and wet-end efficiency of the paper machine; a system for evaluating pulp based on fibre slenderness, length, cohesiveness, inherent strength, wet flexibility, and heating response, instead of the freeness/burst/tear system; and various techniques for preparing groundwood pulp.

2569. **The process of fibre separation.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1956/57*, 1957 (85).

This appears to be controlled by the hydrolysis of co-valent bonds rather than by physico-chemical processes such as swelling. Alkalis are much more effective than acids in catalysing this hydrolysis. Acid hydrolysis, and the resultant increase in ease of mechanical separation of fibres induced thereby, appears to occur in living trees; as would be expected, the greater the age of the tree, the easier it is to defibre. [Cf. *F.A.* 19 No. 4979.]

2570. **Mechanism of delignification.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1956/57*, 1957 (85).

[Cf. *F.A.* 17 No. 1001.] The investigation of alkali delignification of *Eucalyptus regnans* wood has been extended to include the action of NaHS. This reagent converts lignin to a thiolignin, which is more readily soluble in NaOH than the original material. The pH of the NaHS solution controls the amount of lignin dissolved during cooking and also the S content of the lignin remaining undissolved. The former increased with pH while the latter decreased. At fixed pH, the concentration of NaHS has a small but definite effect on the reaction, which is much more pronounced at pH $\leqslant$ 9·0 than at pH 10·1. Pentosan removal is also increased by raising the pH, but is almost independent of the concentration of NaHS at fixed pH.

2571. Enomoto, S., Okada, M., and Koshizawa, T. **Studies on penetration and diffusion of calcium-base sulphite cooking liquor into wood.** *Tappi* 41 (9), 1958 (522–6). 2 refs. P.R.

Cylindrical specimens, 10 cm. diam. × 10 cm. in the fibre direction, were cut from barked *Pinus densiflora*, 20 years old, and the penetration of the liquor during cooking was measured. Penetration was more rapid in the longitudinal direction than in the radial or tangential directions. The wood at the outer surface of the cylinder cooked most readily. When a cylinder was pretreated in a vacuum and flooded with cooking liquor without breaking the vacuum, Ca was evenly distributed through the cylinder, suggesting that penetration had been prevented by the presence of air in the wood.

2572. Placek, C., Buhmann, B. J., and Galganski, R. T. **Chemicals from wood.** *Industr. Engng. Chem.* 50 (4), 1958 (571–6). 11 refs. O.R.S.

Describes, with diagrams, stages in the processing of lignosulphonate compounds at the Marathon plant, a division of the American Can Co., Rothschild, Wis., starting from a 3-stage lime precipitation of the sulphite liquid left after paper manufacture. When concentrated and dried, the products are sold as dispersants, tanning agents, water-treating compounds etc.

862. Composite Materials made Wholly or Partly of Woody Matter

See also Nos. 2230, 2232, 2310, 2422, 2438, 2621.

2573. **Fibreboard and particle board. Report of an international consultation on insulation board, hardboard and particle board, sponsored jointly by the Food and Agriculture Organization of the United Nations and Economic Commission for Europe, Geneva, 21 January to 4 February 1957.** FAO, Rome. 1958. pp. 180.

Contains the following chapters: (1) Product description, nomenclature and definitions (including definitions of some 85 terms, with equivalents in 19 languages for the 17 main items); (2) world production, consumption and trade (24 tables, 20 refs.); (3) raw materials (43 refs.); (4) processes and equipment (54 refs.); (5) economic aspects of production and marketing (17 tables, 12 refs.); (6) properties, applications and uses (29 refs.); (7) research needs; and also the following appendixes: (1) survey of testing methods for fibreboards (*L. J. Markwardt*; 24 refs.); (2) World list of mills: regional summary; (3) Trade associations; (4) Cork and corkboard products; (5) List of papers read.

2574. Steiner, K. Eine neue Spanplattenanlage nach dem System Behr-Himmelheber. **[A new chipboard plant on the Behr-Himmelheber system.]** *Holz Roh- u. Werkstoff* 16 (5), 1958 (165–76). [G.e.] P.R.

A detailed illustrated description of the erection of a modern plant for the Roddis Plywood Corporation at Arcata, Calif., by German engineers with German or German-type equipment. The plant produces high-quality multi-layered boards ('Behr' type) from industrial waste wood, chiefly Redwood and Douglas Fir.

2575. Seifert, K. Beiträge zur Analyse von holzhaltigen Werkstoffen—zweite Mitteilung: die Bestimmung von Phenolharzen in Holzfaser- und Holzspanplatten. **[The analysis of wood-containing materials. Part II: The determination of phenolic resins in fibre- and chipboards.]** *Holz Roh- u. Werkstoff* 16 (9), 1958 (335–40). 9 refs. [G.g.e.] P.R. [Cf. *F.A.* 19 No. 2505.]

2576. Kollmann, F., and Schneider, A. Sorptionsmessungen an Holzwolleplatten. **[Sorption measurements on wood-wool slabs.]** *Holz Roh- u. Werkstoff* 15 (8), 1957 (321–4). 5 refs. [G.g.e.] P.R.

Describes desorption tests with slabs bonded with magnesite or plaster of Paris and the high-vacuum apparatus used. Kiln drying the vacuum-dried slabs at 105° C. caused further loss of weight, which is attributed to chemical changes in the binders.

2577. Entwicklung und Herstellung von Holzspanplatten. **[Development and manufacture of**

chipboard.] *Ber. dtsch. Ges. Holzforsch.* No. 1/57, 1957. pp. 29. [G.] P.R.

A report on a meeting of the relative section of the [W.] German Society for Wood Research. In the discussion on current research, W. Klauditz reported on tests of glue applications, indicating that strengths of boards (bending and in tension ⊥ to surface) obtained by industrial processes fell considerably short of those obtainable in the laboratory with the same raw materials, and suggesting improvements.

2578. KITAMURA, H., IMATA, J., and SHIRIE, M. **[Studies on chipboard prepared with low pressure. I. On the physical and mechanical properties of chipboard in relation to chip size.]** *J. Jap. Wood Res. Soc.* 4 (4), 1958 (151–6). 7 refs. [Jap.e.*e.*] P.R.

Test boards were made from chips of uniform sizes (6 size classes from 0–2 mm. long to 11–13 mm. long), and from mixtures of these uniform size classes (6 different ratios). A pressure of 4·73 kg./sq. cm. was used to make the boards, the impact- and static-bending and compression strengths of which were determined. The best values for bending strengths with boards of uniform chip size were with chips 4–6 mm. long and 0·36 mm. thick; for compression, with chips 11–13 mm. long and 0·50 mm. thick. In boards prepared from mixtures of uniform size classes, all the best strength values were with the mixture containing the greatest number of chips 4–6 mm. long and 0·36 mm. thick. *From authors' summary.*

2579. UCHIDA, H., ÔGANE, K., and SHIMIZU, T. **[On the relation between preparing conditions of particle board and inner temperature during pressing cycle.]** *Wood Ind., Tokyo* 13 (10), 1958 (19–24). [Jap.e.*e.*] P.R.

In making particle boards 10, 20 and 30 mm. thick, of 2 or 3 layers, from chips of *Picea jezoensis* and *Abies sachalinensis* (surface layers) and *Betula tauschii* (centre layer), hot-press temperatures of 145–150° C., and a constant pressure of 38 kg./sq. cm. were used. Results are presented in tables and in graphs of the internal board temperatures during pressing, in relation to the variables, e.g. chip moisture, pressing time.

2580. NICO, R. Paneles de partículas de maderas ligadas con resinas sintéticas. **[Wood particle boards bonded with synthetic resins.]** *Publicación del Laboratorio de Ensayo de Materiales e Investigaciones Tecnológicas, La Plata* (*Ser. 2*) No. 76, 1957. pp. 34. 22 refs. [Span.span.e.]

Deals with types of particle board, raw materials, manufacturing processes, experiments in manufacturing particle board from Poplar and Willow waste wood from the Paraná Delta, cost of production, and other economic data. With a mixture of sawdust and urea-formaldehyde in proportions of 100/7 or 100/8, boards can be produced of medium density and excellent appearance and workability. Experiments in making composite panels were also successful.

2581. ČEREZOVA, V. M. Vlijanie temperatury pressovanija na pročnost' plit iz drevesnyh častic. **[The influence of press temperature on the strength of particle boards.]** *Derev. Prom.* 7 (10), 1958 (7–8). [Russ.russ.] P.R.

In preliminary experiments, particle boards 20 mm. thick and of density 0·7 g./c.c., were prepared by the Bartrev method, using a urea-formaldehyde resin, and pressed for 20 min. at 25 kg./sq. cm. at 110, 120, 140 and 150° C. Swelling pressure was measured by a modified Ivanov [see *F.A.* 15 No. 4041] instrument, and both swelling pressure and swelling time were found to increase with increased press temperature. Static bending strength of the boards also increased with press temperature, being 130 kg./sq. cm. at 110°, and 157 kg./sq. cm. at 150°.

2582. FUJII, J. S. **The effect of overlay materials on the flexural properties of commercial particle board.** *For. Prod. J.* 8 (8), 1958 (219–24). 1 ref.

Describes tests with 4 types of board and 5 of overlay, indicating that bending strength and stiffness are governed largely by the overlay, on the 'stressed-skin' principle. In most cases these properties were increased to levels comparable to those of plywood or solid wood. An overlay consisting of Douglas Fir veneer $\frac{1}{8}$-in. thick with grain parallel to span gave the greatest increase in strength.

2583. Entwicklung und Herstellung von Holzfaserplatten. **[Development and manufacture of fibreboards.]** *Ber. dtsch. Ges. Holzforsch.* No. 1/56, 1956. pp. 21. [G.] P.R.

Report of a meeting of the relative section of the Society, covering: Structure and aims of FAO (*G. S. Welsh*); The economic position of fibreboard manufacture (*Kummer*); Raw-material problems (*W. Storek*; *Zollinger*); and The semi-dry process of fibreboard manufacture (*A. Wilke*), with discussions.

2584. PAULI, W. R. DE. Rapport au Gouvernement du Viet-Nam sur la possibilité de produire des panneaux de construction avec des déchets organiques et plus particulièrement sur la construction d'habitations populaires. **[Report to the Government of Viet-Nam on the possibility of producing building boards from organic waste [wood and bamboo], with particular reference to house building.]** Expanded Technical Assistance Program, FAO, Rome. *FAO Report* No. 751, 1958. pp. 3 + 1 map, 2 sets of dgms. [F.] Limited distribution.

2585. HELGE, K. Anvendelse av lagret, tørt virke som råstoff for porøse trefiberplater. **[The use of dry stored wood as raw material for porous fibre boards.]** *Norsk Skogind.* 12 (10), 1958 (371–82). 1 ref. [Nor.e.] P.R.

Laboratory experiments showed that stored dry slabs and smallwood of Spruce gave boards with higher water absorption and swelling, and poorer colour than those from fresh wood; power consumption during defibration was also higher and yields lower. Boards from the stored wood, however, were equivalent in specific gravity and strength if the pulps were refined to the same degree of freeness. The experiments indicated that drying during long storage out of doors is responsible for these differences; the same effects were not produced by rapid drying of fresh wood in the laboratory.

2586. DOSOUDIL, A. Untersuchungen über den Einfluss von verschiedenen Versuchsbedingungen auf die Wasseraufnahme und Dickenquellung von Holzfaser-Isolierplatten. [**Investigation on the influence of different test conditions on the water absorption and swelling of insulation fibreboards.**] *Holz Roh- u. Werkstoff* 16 (8), 1958 (297–306). 10 refs. [G.g.e.] P.R.

Factors examined were: water temperature; the position (upright or flat) of the specimens in the water; size of specimens; the use of edge coatings; the pH of the water; and the duration of the test. Results are shown in graphs and tables.

2587. DOSOUDIL, A. Gütebestimmungen für Holzfaserplatten. Geschichte der deutschen Gütebestimmungen und ihr Vergleich mit den Bestimmungen anderer Länder. [**Quality specifications for fibreboards. History of German specifications and comparisons with specifications of other countries.**] *Holz Roh- u. Werkstoff* 15 (12), 1957 (500–11); 16 (3), 1958 (109–10). [G.g.e.] P.R.

Discusses requirements, definitions etc. of the relevant German, British, Japanese, Northern (Swedish-Finnish-Norwegian), South African and U.S.A. standards, including recent changes in the last named, and the lack of comparability owing to lack of uniform testing methods.

2588. LUNDGREN, Å. Die hygroskopischen Eigenschaften von Holzfaserplatten. [**The hygroscopic properties of fibreboard.**] *Holz Roh- u. Werkstoff* 16 (4), 1958 (122–7). 4 refs. [G.g.e.] P.R.

A discussion of shrinking, swelling, and warping behaviour under the influence of atmospheric humidity and wetting, based on recent research in Scandinavia, with special reference to hysteresis and irreversible changes, which cause difficulties in testing and actual use, and some suggestions for improvements.

863. Wood Hydrolysis. Saccharification

2589. ODINCOV, P. N., KAL'NINA, V. K., and SOBOLEVSKIJ, Č. A. Gidroliz drevesiny koncentrirovannoj sernoj kislotoj. [**Wood hydrolysis with concentrated H_2SO_4.**] *Gidrol. lesohim. Prom.* 10 (1), 1957 (4–7). 8 refs. [Russ.russ.] P.R.

In a 4-stage preliminary hydrolysis, each stage lasting 15 min., conifer chips were boiled in 1% H_2SO_4 at a temperature of 140° C. [cf. *F.A.* 15 No. 3078]. The amount of reducing substances obtained varied between 21·76 and 25·94% (in % of absolute dry wood). In the main hydrolysis process the wood cellulose (dried to 5–7% m.c.) was ground and treated with 75% H_2SO_4 at 50–55° for 30 min. The total yield of reducing substances amounted to 63–65%, of which 90% was glucose.

2590. ZAKOŠČIKOV, A. P., and ČERNOVA, O. T. Primenenie ingibitorov pri gidrolize rastitel'nyh materialov. [**The use of inhibitors in the hydrolysis of plant material.**] *Gidrol. lesohim. Prom.* 10 (6), 1957 (5–7). [Russ.] P.R.

Experiments were made in wood hydrolysis with 1% H_2SO_4 for 30 min. at various temperatures from 150 to 190° C., and also adding 4% FeS, an inhibitor of sugar decomposition, or the catalyst $Cr_2(SO_4)_3$. At 170–190° the FeS increased the yield of reducing sugars slightly, and halved the amount of decomposed sugar compared with the H_2SO_4 treatment alone, while the unhydrolysed residue increased by a corresponding amount. The $Cr_2(SO_4)_3$ decreased the sugar yield without increasing the unhydrolysed residue. Tests also showed that, in a 4-stage hydrolysis, adding FeS at a rate of 1·85% of the weight of the oven-dry wood increased the yield of reducing sugars from 48 to 57·7% (of oven-dry wood weight), indicating the practical possibilities of using inhibitors.

2591. ITO, T., and NAKAYAMA, N. [**Study on pretreatment in wood saccharification process. I. Pretreatment with water.**] *J. Jap. Wood Res. Soc.* 4 (4), 1958 (142–6). 15 refs. [Jap.e.*e.*] P.R.

Fagus crenata was pretreated with water at 140–250° C. The formation of furfural was more influenced by cooking temperature than by the concentration of organic acids produced, and its max. yield was ca. 50% of the theoretical at 190°. Below 210° the yields of residual wood decrease to 65–70% of the original wood; above 210° they decrease to 45–50%, owing to cellulose decomposition. More than 90% of the pentosans in the wood were removed in 2 hours' cooking at temperatures > 180° C. Pretreatment with water at ca. 190° was concluded to be a suitable method of preparing furfural in saccharification. *From authors' summary.*

2592. SNYDER, F. H. **Sugars from wood products.** *U.S. Patent* No. 2,835,611, 1958. From *abstr.* in *Chem. Abstr.* 52 (18), 1958 (15940–1). P.R.

The wood is impregnated with NH_4OH or a hydroxide of an alkali or other substance, sufficient to give a pH of 3·1–3·4 in the reaction product. The drained wood is steamed at 600–1250 lb./sq. in. for 1–5 min, Recoverable by-products include furfural, CH_3COOH and lignin in a highly depolymerized, low-molecular form. The liquid reaction product contains about 30% glucose and xylose and a large amount of di- and trisaccharides, which can be converted to monosaccharides by further treatment.

2593. ZAJCEVA, A. F., FEDORIŠČEVA, I. P., and NIKITIN, N. I. Izvlečenie i ispol'zovanie vodoèkstraktivnyh veščestv daurskoj listvennicy metodom gidroliza. [**Extraction and utilization of the water-extractives of *Larix dahurica* by hydrolysis.**] *Gidrol. lesohim. Prom.* 10 (2), 1957 (3–6). 5 refs. [Russ.russ.] P.R.

A shortened method of obtaining the water-extractives of *L. dahurica* chips by processing in autoclaves for 2 hours at 150° C. gave satisfactory yields of arabogalactan, though somewhat smaller than those obtained by boiling the chips for 22 hours. The pure arabogalactan was easily hydrolysed, at 170° for 10 min., both by 0·1 [%?] H_3PO_4 at an arabogalactan concentration of 10–12%, yielding 99% reducing substances, and by 0·15% H_2SO_4. Higher concentrations of H_2SO_4 did not increase the yield of reducing substances (93–95%). The largest yield of reducing substances from the

water extract (95%) was obtained by hydrolysis with 0·15% H_2SO_4 at 160° for 10 min. The hydrolysate of crude arabogalactan when fermented by yeast (*Schizosaccharomyces* spp.) gave 61·81 litres alcohol/100 kg. fermented sugar—96% of the possible theoretical yield.

864. Utilization of Lignin

See No. 2572.

865. Plastics

See No. 2442.

866. Utilization of Wood Extractives

See Nos. 1522, 2556, 2593.

867. Destructive Distillation

2594. BALDWIN, H. I. **The New Hampshire charcoal kiln.** *Bull. Fox For.* No. 11, 1958. pp. 84. 69 refs. Price $0.50.

Gives a detailed description of the kiln (a modification of the Black Rock steel drum kiln) and its operation. The object of this class of kiln is to utilize thinnings by charcoal-burning in the woods, the principal innovation in this model being the elimination of idle time.

2595. MONSALUD, M. R., and BAWAGAN, P. V. **Charcoal production and briquetting.** *For. Leaves, Philippines* 10 (1), 1957 (23–6, 30 + 2 photos, 1 dgm.).

Sawmill waste (mixed species) was experimentally converted into lump charcoal, using a Connecticut-type kiln. Good briquettes were made from the charcoal, using as binders molasses and cassava starch. The cassava briquette is cheap to produce and should be a good substitute for metallurgical coke.

2596. PALEKANDA, M. W. ***Eucalyptus*, as a raw material, in the commercial manufacture of charcoal and acetic acid.** *Indian For.* 84 (9), 1958 (563–5).

Factory-scale operations showed that the yield of charcoal and acetic acid from plantation-grown *E. citriodora* and a *Eucalyptus* hybrid was considerably higher, and of better quality, than that from a mixture of native jungle species, the usual raw material.

2597. KATUNIN, V. H. Piroliz drevesiny s tverdym teplonositelem. **[Wood decomposition by a solid heat-carrier.]** *Gidrol. lesohim. Prom.* 10 (3), 1957 (4–6). 7 refs. [Russ.russ.] P.R.

Describes a method of decomposing wood chips (in this case Birch) to obtain a combustible gas of high calorific value as a substitute for liquid motor fuel. Higher yields were obtained when the wood was partially carbonized in a fluid medium at 270–275° C., and then decomposed by a solid conductor of heat at a temperature of 700–800°.

2598. BLACKWOOD, J. D. **Production of methane from carbon.** *Nature, Lond.* 182 (4641), 1958 (1014). 4 refs.

Wood charcoal, prepared at 870° C. from *Eucalyptus marginata*, when made to react with H at the same temperature and pressure (30 atm.), gave a rate of formation of methane of ca. 45×10^{-5} g.mol./min./g. carbon. The formation of CH_4 during the carbon-steam reaction is important technically since it results in a reduced heat requirement for the gasification of C with steam, due to the exothermic nature of the reaction producing CH_4.

2599. GEERARDS, J. J. T. M., KREVELEN, W. VAN, and WATERMAN, H. I. **The effect of iodine and hydrogen on coal, wood, and carbohydrates.** *Brennstoff-Chemie, Essen* 39 (Spec. No.), 1958 (11–4). [G.?] From *abstr.* in *Chem. Abstr.* 52 (18), 1958 (15874). P.R.

Coal, wood and carbohydrates can be converted into liquid hydrocarbons by catalytic decomposition with H and I. Cellulose, starch, sugar and wood are converted into liquid products at 300–325° [C.]; 75% of the C is transformed into oils practically free of O. HI can be used as the catalyst.

89. Other ('Minor') Forest Products

892. Vegetable Products

See also No. 2648.

2600. OLIVER, B. **Nigeria's useful plants.** *Nigerian Field* 23 (4), 1958 (147–71). 21 refs.

This is part 1 (plants yielding fibres, fats and oils) of an illustrated series. Parts 2–4 will cover medicinal plants; 5, gums, resins and rubber; 6, essential oils; and 7, dye plants. Notes on propagation and habit of the plants and the nature and processing of the products are included.

892.4. Bark Products. Tanstuffs. Cork

See also No. 1423.

2601. BLAŽEJ, A., and MARKUŠOVSKÁ, E.; BLAŽEJ, A. **[1] The sulfite extraction of Spruce bark. [2] Analysis of tanning barks and woods.** *Věda a Výzkum v Průmyslu Koždělném, Czechoslovakia* 3, 1958 (43–52; 119–26). [Cz.?] From *abstr.* in *Chem. Abstr.* 52 (19), 1958 (16771–2). P.R.

[1] Chemical analyses by successive extractions were made before and after extraction with water and with different amounts of a 1/1 mixture of $NaHSO_3$ and Na_2SO_3. Extractable tannins in the bark increased from 8·8% by H_2O extraction to 17·9 % by extraction with the highest concentration of sulphite; analysis of the extracted barks, however, showed that the additional material fixed by hide powder that is extracted by sulphite is not tannin, but consists of polyuronides, hemicelluloses and a small amount of disaccharides. [2] The need for chemical analysis of Spruce bark for its better utilization is stressed. Results of analysis by successive extractions are given.

2602. DÄSSLER, H.-G., and URZYNICOK, H. Über den Gerbstoff der Schwarzerle (*Alnus glutinosa* Gärtner). **[The tannin of *A. glutinosa*.]** *Holz Roh- u. Werkstoff* 16 (9), 1958 (327–30). 10 refs. [G.g.e.] P.R.

A tannin isolated from the bark consisted of an aglucone mixture and 39% sugar, identified as glucose. In view of a suggestion that Alder tannins cause dermatitis, tests were made on

humans, rats and rabbits, with negative results. [Cf. *F.A.* 18 No. 3342.]

2603. SINGH, T., *et al.* **Some vegetable tannin materials of Jammu and Kashmir.** *Indian For.* 84 (9), 1958 (571–6).

Tabulates analytical data of 58 species of plants found in this region, of which ca. 25 possess tannin %s ⩾ 7.

2604. BECKER, E. S., and KURTH, E. F. **The chemical nature of the extractives from the bark of Red Fir [*Abies magnifica* and *A. magnifica* var. *shastensis*.]** *Tappi* 41 (7), 1958 (380–4). 11 refs. P.R.

The extractive contents of both varieties were found to range from 21 to 38% of the moisture-free weight of bark, bark from the butt of the trees containing the most extractives. The following components were definitely identified: wax, catechin, quercetin, protocatechuic acid, a new purple colouring substance that appeared to be a polymer of cyanidin, tannin, phlobaphene, and an arabogalactan gum. Other substances were tentatively identified by chromatography and the gum and wax analysed. *From authors' summary.*

2605. HOSSFELD, R. L., and HUNTER, W. T. **The petroleum ether extractives of Aspen [*Populus tremuloides*] bark.** *Tappi* 41 (7), 1958 (359–62). 21 refs. P.R.

[Cf. *F.A.* 19 No. 3397.] Tabulates the results of successive extraction of layers of fresh, normal Aspen bark (representing the phellem, phelloderm, and secondary phloem) with petroleum ether, ethyl ether, C_6H_6, ethanol, and hot water. The bark gave a 3·8% yield of petroleum-ether extractives. Solvent fractionation and chromatography of the saponification products led to the identification of lignoceric acid, linoleic acid, β-sitosterol, ceryl alcohol, an unsaturated β-OH-sterol, and a hydrocarbon. Glycerol was isolated from the aqueous saponification residue.

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants, etc.

2606. HASEGAWA, S., *et al.* Études sur l'action antibiotique des plantes du Japon. **[Study of the antibiotic effect of Japanese plants.]** *C.R. Soc. Biol., Paris* 152 (2), 1958 (391–2). [F.] O.R.S.

Extractives (from various parts of the plant) showing an antibiotic effect on *Staphylococcus aureus* and/or *Escherichia coli*, and generally inhibiting growth of *Mycobacterium tuberculosis*, were obtained from species of *Abies*, *Acacia*, *Acer*, *Alnus*, *Betula*, *Carpinus*, *Castanea*, *Chamaecyparis*, *Cryptomeria*, *Fraxinus*, *Pinus*, *Quercus*, and *Shiia*, among others.

2607. JAYAWEERA, D. M. A. **Indigenous and exotic drug plants grown in Ceylon. Part IV.** *Trop. Agriculturist, Ceylon* 113 (1), 1957 (55–85). 21 refs. O.R.E.

Describes 30 plants, including some trees, and the composition and uses of the drugs derived from them.

2608. **A note on the plants of medicinal value found in Pakistan.** Medicinal Plant Branch, Pakistan Forest Research Institute, Abbotabad. Rev. ed., 1956 (1957). pp. 55. Price *Rs.*1–14–0.

Lists 356 plants by scientific names, giving local names and notes on type of plant (herb, tree etc.), distribution, frequency of occurrence, and uses.

2609. HUMPHREYS, F. R. **Corkwood (*Duboisia*) species as a source of valuable drugs.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 11 (1/2), 1958 (9–11). 2 refs.

[Cf. *F.A.* 19 No. 3643.] Covers the distribution of *D. myoporoides*, *D. leichardtii* and *D. hopwoodii*, the history of the exploitation of the first two, and methods of harvesting and drying the leaves, which are exported. Drying leaves of the first species at 90° C. for 17 hours had no effect on total alkaloid content (*ca.* 3%, mainly hyoscine and hyoscyamine).

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap Sugar

See also Nos. 1424, 1489, 1526.

2610. ***Naval Stores Review*—International Yearbook.** *Naval Stores Rev.* Spec. No., 1958. pp. 62.

In addition to some general articles, this number contains statistics for U.S. resin products production, movement, stocks, consumption, exports, imports and market statistics, and for foreign resin products production, consumption, imports and exports. The years covered range from 1935 to 1958.

2611. BARDYŠEV, I. I., *et al.* Opyt promyšlennogo polučenija kanifoli iz živicy eli. **[An experiment in the industrial production of rosin from Spruce resin.]** *Gidrol. lesohim. Prom.* 11 (1), 1958 (22–3). 10 refs. [Russ.] P.R.

The authors' analysis of Spruce resin and rosin is presented and a procedure described for the industrial preparation of size for drawing-paper from the rosin. In the light of these results the need to improve methods of resin-tapping of Spruce is stressed.

2612. BARDYŠEV, I. I., and ČERČES, H. A. Neoabietinovaja kislota—pervičnaja kislota živicy eli obyknovennoj (*Picea excelsa*). **[Neoabietinic acid—a primary acid of Spruce (*P. abies*) oleoresin.]** *Ž. prikl. Him.* 31 (8), 1958 (1276–7). 6 refs. [Russ.] L.S.

Neoabietinic acid, found in Pine resin, was also identified in Spruce resin in addition to the other resin acids.

2613. UVAROVA, N. I., MOROZOVA, O. V., and IVANOVA, P. I. Sostav skipidara iz živicy eli ajanskoj (*Picea ajanensis* Fisch.). **[The composition of turpentine from *P. jezoensis* resin.]** *Ž. prikl. Him.* 30 (8), 1957 (1274–6). 11 refs. [Russ.] L.S.

A detailed analysis.

2614. BARDYŠEV, I. I., SOKOLOV, A. G., and ČERNJAEVA, O. I. Vydelenie čistoj dekstropimarovoj kisloty iz živicy *P. silvestris*. **[The isolation of pure dextropimaric acid from *P. sylvestris* oleoresin.]** *Ž. prikl. Him.* 31 (4), 1958 (609–13). 14 refs. [Russ.russ.] L.S.

The pure acid was isolated from *P. sylvestris* oleoresin and its physical constants, which showed considerable variation, were determined.

2615. BARDYŠEV, I. I., and ČERČES, H. A. Smoljanye kisloty živicy sosny krymskoj (*Pinus pallasiana* Lamb.). [**Resin acids of the oleoresin of *P. nigra* var. *caramanica***.] *Ž. prikl. Him.* 31 (7), 1958 (1122–4). 14 refs. [Russ.russ.] L.S.

The acid fraction of the oleoresin was found to be composed mainly of levopimaric, abietinic and neoabietinic acids.

2616. LOEBLICH, V. M., and LAWRENCE, R. V. **Inhibition of resin acid isomerization**. *Industr. Engng. Chem.* 50 (4), 1958 (619–20). 9 refs. O.R.S.

It was found that the extent of isomerization of the levopimaric acid in Pine oleoresin could be controlled by adding an alkali, e.g. NaOH, Na_2CO_3 or KOH, to the crude oleoresin before it was processed into rosin. The amount of levopimaric acid in the resin increased with an increase in the % of acids neutralized. These partially neutralized resins should be more resistant to oxidation and show less tendency to crystallize, and should be more effective in certain types of reaction.

2617. SPOON, W. Etherische oliën van Nieuw-Guinea. [**Essential oils from New Guinea.**] *Ber. trop. Prod. Inst. Trop. Amst.* No. 265, 1958. pp. 12. 6 refs. [Du.e.] (*Repr.* from *Chemisch Weekblad, Amsterdam* 54 (18), 1958 (236–9).)

Includes data on the production of oil from the bark of *Cinnamomum culilawan* and *Cryptocarya massoy*.

2618. CASIER, J. P. J. Analyse van *Trichilia quadrivalvis* D.C. Een belangrijke oliehoudende plant uit de hoogvlakte van Kwango. [**Analysis of *T. quadrivalvis*, an important oil-bearing plant of the Kwango plateau [Belgian Congo].**] *Bull. agric. Congo belge* 49 (5), 1958 (1301–5). 7 refs. [Du.f.]

The seeds of this light demander, of possible great economic interest, contain 52% fatty matter, and the residual cake 20% proteins. The light-green, viscous oil has iodine and saponification indices of 33·5 and 221. Production per ha. and food value are not yet known.

2619. TINTO, J. C. Cera de retamo. Nuevo método de elaboración. [***Bulnesia retama* wax. A new processing method.**] *Rev. Invest. for., B. Aires* 1 (4), 1957 (73–82+28 photos). 4 refs. [Span.]

Describes a method adopted in San Juan province, with some suggestions for its improvement.

892.7. Fruits. Seeds. Fibres, Yarns and Flosses

2620. FLOCH, H. Les fruits à carotène guyanais. [**Carotene-containing fruits of French Guiana.**] *Qualit. Plant. Mater. Veg.* 3 (4), 1958 (327–35). 8 refs. [F.f.e.g.] E.M.B.

Notes on the carotene content and nutritive properties of the fruit of various species, most important of which is *Astrocaryum vulgare*. The pulp of the pericarp of this fruit contains 20–37% oil and is rich in carotene (25–33 mg./100 g.).

2621. BLANCO, A. B. Un nuevo recurso forestal para la elaboración de material aislante. [**Insulating materials from a new forest source.**] *Rev. Invest. for., B. Aires* 1 (4), 1957 (63–71 + 3 plates). 4 refs. [Span.]

Presents information on the cactus *Cereus coryne*, its distribution and ecological requirements, and the appearance and characteristics of the stems. An insulating material with properties similar to those of cork can be made as follows: Stems are cut into lengths $\geq$ 0·8 m., passed through a defibrating mill, and then through a press, leaving a moisture content of ca. 19–26%. The fibrous matter is next dried in a kiln to ca. 10–18% m.c. and passed into a mixer into which is introduced an adhesive substance (e.g. a formaldehyde glue). It is finally pressed in a hydraulic press at 130° C. The thermal properties of the product are specified.

892.8. Heather. Broom etc. Osiers. Canes and Bamboos. Reeds and Rushes. Thatching Materials

See Nos. 2488–90, 2525.

9. FOREST AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. General

2622. **National progress reports on forestry**. [*Docum.*] *2nd Sess. FAO Near East For. Comm., Rome 1958* Nos. *FAO/NEFC*-58/3, 5–7, 9–10 & 12–14, 1958. [E. or F.] Limited distribution.

(3) Afghanistan (pp. 5); (5) Iran (pp. 17); (6) Iraq (pp. 17); (7) Jordan (pp. 6); (9) Tripolitania (pp. 13); (10) Sudan (pp. 17); (12) United Arab Republic—Syria (pp. 16); (13) U.K.—Cyprus (pp. 55); (14) U.K.—Somiland (pp. 21).

2623. **National progress reports on forestry**. [*Docum.*] *6th Sess. FAO Latin Amer. For. Comm., Guatemala, 1958* Nos. *FAO/LAFC* 58/6–14, 16–26 & 32, 1958. [Span., E., or F.] Limited distribution.

(6, Suppl. 1) Argentina (pp. 9 + 5); (7+Suppl. 1) Brazil (pp. 10 + 5); (8) Chile (pp. 4); (9) Colombia (pp. 7); (10) Cuba (pp. 2); (11) Dominican Republic (pp. 5); (12) Ecuador (pp. 5); (13) El Salvador (pp. 2); (14) Guatemala (pp. 4 + 3); (16) Honduras (pp. 7); (17) Panama (pp. 3); (18) Paraguay (pp. 5); (19) Peru (pp. 7); (20) Uruguay (pp. 4); (21) Venezuela (pp. 20 + 8); (22 + Suppl. 1) Guadeloupe, Martinique and French Guiana (pp. 8 + 4); (23) Surinam (pp. 3); (24) British Guiana (pp. 6); (25) Jamaica (pp. 3); (26) Trinidad and Tobago (pp. 5); (32) British Honduras (pp. 10).

902. History of Forests and Forestry

See also No. 1664.

2624. **The state of food and agriculture 1958**. FAO, Rome. 1958. pp. 222.

Includes a chapter (pp. 163–97) on 'The growth of forest industries and their impact on the world's forests'—a broad historical review of the subject.

2625. QVIST, A. **The management of Epping Forest.** *J. Land Agents' Soc.* 57 (11), 1958 (426–37).

Describes the management of the forest, essentially as a nature reserve and recreational area, since the Epping Forest Act of 1878 'disafforested' it [i.e. repealed traditional forest laws]. The ecological effects of terminating rights to cut or take wood (chiefly by lopping) are discussed.

2626. VIETINGHOFF-RIESCH, BARON VON. **Outlines of the history of German forestry.** *Irish For.* 15 (1/2), 1958 (34–5).

2627. BUCHHOLZ, E. Aus der Geschichte der russischen Forst- und Holzwirtschaft. [**The history of Russian forestry and the timber industry.**] *Forstwiss. Cbl.* 76 (7/8), 1957 (208–29). 48 refs. [G.]

Covers the development of Russian forestry from its beginnings to the time of Peter I, i.e. a period of primitive forestry; and the development of forestry in the 18th century, a period of strong western influence.

2628. SOSA, A. H. En los bosques de la Malinche. [**In the Malinche forests [Tlaxcala/Pueblo State Boundary**].] *Mensajero for., Durango* Nos. 162; 164, 1958 (11–3, 21–3; 7–10, 28–9). 2 refs. [Span.]

Drawing on 16th century reports, legal decrees and decisions, and on 4 visits made between 1927 and 1957, the author describes the original and present state of the forests, changes in their communal ownership and their progressive destruction in this 700-sq. km. national park. To save them and still provide a local source of income, a regularly organized resin-tapping unit is recommended.

903. Forest Policy, General

See also Nos. 2659–60.

2629. STEIN, A. H. **Forest policy and legislation.** *Carib. For.* 18 (3/4), 1957 (68–87). [E.]

Discusses the principles for a basic policy under the heads: definition of, kinds of, and time and reasons for, forming a policy, general features of a national policy, functions of a forest service, the fundamentals enumerated in resolution 26 of the F.A.O. conference, Rome, 1951, the dedication of areas for protection and production, implementation, legislation, organization and finance. Indian policy, legislation and organization are instanced.

2630. RENDON T., C., and VARGAS E., R. El cultivo de los bosques mexicanos: base de nuestra política forestal. [**The development of the forests of Mexico: the basis of our forest policy.**] *Mensajero for., Durango* No. 165, 1958 (22–4, 26–9). [Span.]

Outlines an ideal policy and describes in detail how the present law and its application fail.

2631. ZARZOSA L., O. Problemas de la industria forestal de Durango. [**Forestry problems in Durango State, [Mexico].**] *Mensajero for., Durango* Nos. 162; 164, 1958 (14–5, 18–20; 16 . . . 22). [Span.]

The State area of ca. 12,352,000 ha. contains 4·1 million ha. of Pine/Oak montane forest and 1 million of tropical forest. Recommendations are made for the solution of the chief problems—lack of inventory, inconsistent legislation, lack of control in exploiting communal forests (ca. 800,000 ha.), little or no replanting, fire damage to natural regeneration, fire protection, shifting cultivation, epidemics of insects and fungi, grazing and lack of credit for planned timber exploitation.

2632. RAGONESE, A. E. Política forestal argentina. [**Argentine forest policy.**] *Bol. argent. for.* 16 (154), 1957 (7–10). [Span.]

The president of the forestry commission discusses the precarious state of the Quebracho industry and the degradation of the Chaco and Andes forests by over-exploitation and primitive grazing practices. Recommendations include the State planting of Quebracho (rotation 100 years) and of Black Wattle, the raising of Pines, Eucalypts and *Araucaria angustifolia*, the estimated requirement being 400,000 ha., the clearing, fencing and seeding of pastures (fodder varieties listed), the delimitation of areas for forests, measures for reforming land use and tenure, the concentration and improvement of agriculture and cattle raising in the Pampas, and the separation of forest units in the national parks of the Andes.

2633. CONSIGNY, A. Formulación de una política forestal. Necesidad imperiosa para Chile. [**The formulation of a forest policy: an urgent necessity for Chile.**] *Bol. argent. for.* 16 (154), 1957 (11–2). 1 ref. [Span.]

2634. DOMINGUEZ ORONA, O. Algunos aspectos forestales del Plan Chillán. [**Some forestry aspects of the Plan Chillán.**] *Silvicultura, Uruguay* No. 7, 1955 (5–28). 4 refs. [Span.e.]

The 'Plan' is a programme for raising the standard of living and of husbandry in the agricultural districts of Monte Ñuble and Concepción (Chile). Activities are based on the city of Chillán. Notes are presented on the forestry programme, including trials of exotics, establishment and work of the forest nursery, and the cultivation of *Pinus radiata*.

904. General Regional Accounts of Forests and Forestry

2635. SABROE, A. S. **Danish and Irish forestry compared.** *Irish For.* 15 (1/2), 1958 (7–17, 55–9).

A paper read at the annual general meeting of the Society of Irish Foresters, 15 March 1958, with discussion.

2636. HESMER, H. Wald- und Forstwirtschaft in Nordrhein-Westfalen. [**Forestry in Nordrhein-Westfalen.**] Verlag M.u.H.Schaper, Hannover-Waldhausen. [1958?] pp. viii + 540. [G.] Price *DM.*44. From review in *Allg. Forstzeitschr.* 13 (33), 1958 [i].

The 15 sections cover soils, agrarian structure, climate, the natural forest vegetation, historical and economic factors in the present distribution of forests, losses in forest area, and afforestation, ownership, composition, yield, forest injuries (including game), administration and policy, etc.

2637. Foresterie dans le grand-duché de Luxembourg. [**Forestry in the Grand-Duchy of Luxembourg.**] *Bull. Soc. for. Belg.* 65 (10), 1958 (647–61). [F.]

2638. STREYFFERT, T. **Forestry in Sweden.** School of Forestry, Oregon State College, Corvallis. 1958. pp. 55 + 7 photos.

A compilation of lectures delivered at the School of Forestry, Corvallis, with sections on: forest regions; introduction to Swedish forestry; forest policy; forest research; Kramfors company, a case history; the farm forest problem; world timber trends; does forestry pay?; and appendices on forest facts (tabulated data), and the Swedish forest law.

2639. YOVITCH, D., *et al.* Les forêts et l'économie forestière de la Yougoslavie. [**The forests and forest economy of Jugoslavia.**] *Bull. Soc. for. Belg.* 65 (11), 1958 (673–700 + 6 photos). [F.]

2640. POZDNJAKOV, L. K. Lesa Jakutii. [**The forests of the Yakutsk ASSR.**] *Lesn. Hoz.* 11 (3), 1958 (34–9). [Russ.]

The area of Yakutia is almost one-sixth that of the U.S.S.R.; its forest area is ca. 219 million ha., of which 119 million ha. are actually covered by forest (Larch 108 million ha., Scots Pine 8 million, Spruce and Fir 1 million, Birch and other broadleaved species 2 million), and 4 million ha. by *Pinus pumila* scrub. The soils are for the most part slightly leached, sod-forest soils. The most important factor for forest growth is permafrost: at Verkhoyansk the soil thaws to a depth of 0·4–1·2 m. and at Yakutsk to 1–2 m. The % of forest cover varies from 32–35% in the N. and mountainous regions, to 75–82% in the S.W. Most of the stands are mature or over-mature, and their average density is usually ⩾ 0·5–0·6. The distribution and importance of the various species, particularly Larch, are discussed: *Larix gmelinii*, the dominant species of the taiga, is found as far N. as 72° 30′, and in N.W. Yakutia it ascends to 1100–1200m. alt. Plans for the utilization of the forest resources are being made, and are expected to be put into operation soon.

2641. KOZLOVSKIJ, B. A., and ŽOHOV, P. I. Lesa Mongol'skoj Narodnoj Respubliki. [**Forests of the Mongolian People's Republic.**] *Lesn. Hoz.* 11 (1), 1958 (87–9). [Russ.]

A general account covering geography and climate, stressing the high mean altitude of the country, its dry atmosphere and low rainfall. The forest area, mainly montane taiga in the N. of the country, covers ca. 8% of the land area and is estimated at 12 million ha. *Larix sibirica* is the main species, then *Pinus sibirica*, *P. sylvestris*, Birch and *Populus tremula*. The principal forest regions are briefly described. Forestry is expected to expand, and to benefit from the link-up of Mongolia's railway system with that of the U.S.S.R. and China.

2642. BOROVOJ, V. Lesnaja promyšlennost' novoj Birmy. [**Forest industry of modern Burma.**] *Lesn. Prom.* 1958 (9), (27–8). 4 refs. [Russ.]

Discusses progress since Burmese independence, plans and targets for future development of the timber industry, technical assistance given to Burma by the U.S.S.R., Burmese exports to the U.S.S.R., etc.

2643. MOONEY, H. F. **A note on the forests in and around the Aruanna mountains in Bale subprovince and on forest co-operatives [Ethiopia].** British Middle East Development Division, Addis Ababa. 1958. pp. 5. Limited distribution. I.F.B.

2644. RENIER, H. J. Monographie forestière de la Province du Kasai. [**Forest monograph on the Kasai Province [Southern Belgian Congo].**] Direction de l'Agriculture, des Forêts et de l'Élevage, Brussels. 1957. pp. 130 + 52 photos, 1 map. 37 refs. [F.]

Covers legislation and reservations; climate, soils and flora; economics and exploitation; problems, programmes and silvicultural work (crown improvement fellings and enrichment); and planting for timber and fuel and for protection (including savanna). A vegetation map shows the (latitudinal) distribution of zones: evergreen rain, semi-evergreen, and moist deciduous forest, for each of which enumeration data are tabulated.

2645. BABCOCK, H. M. Les forêts du Canada. [**The forests of Canada.**] *Bull. Soc. for. Belg.* 65 (10) 1958 (617–46). [F.]

2646. **The Prince George area [British Columbia].** *Timberman* 59 (11), 1958 (36–42).

The district contains, in millions of M [1000] bd.ft., Spruces (mainly White) 105·9, Lodgepole Pine 35·3, *Abies* spp. 35·2, Western Red Cedar 5·9, Douglas Fir 5·2, Poplars 4·5, Western Hemlock 3·7, other deciduous species 3·4, total 199·1. The 384 mills producing 283·6 thousand bd.ft. in 1948, had become 704 producing 632·1 by 1957. Logging and the economic situation are described. Clear felling in alternate 40 × 4-chain strips or in blocks scarified to promote regeneration from natural seeding, or felling of trees marked to a diameter limit, are practised.

2647. HORN, E. F. **The lumber industry of the lower Amazon valley.** *Carib. For.* 18 (3/4), 1957 (56–67). [E.]

A detailed account, covering transport and navigation, forest types, timbers and their properties, primitive logging and antiquated sawmilling, with recommendations for their improvement, integration of utilization, very low timberland prices, wages and costs, taxes, markets, methods of measurement, prices, planting, and the field for investment and development.

2648. ZIMMERMANN, J. Studien zur Anthropogeographie Amazoniens. Der Wirtschaftsraum Santarém. [**Studies of the social geography of the Amazon. The economic region of Santarém.**] *Bonner Geographische Abhandlungen, Bonn* No. 21, 1958. pp. 96 + 12 photos. 58 refs. [G.]

Includes a brief description of topography, climate, vegetation types etc. of West Parà and of the economic activities of its people, such as shifting cultivation, collection of wild rubber, para nuts, and other minor forest products, including some recent statistics.

905. Forest Statistics and Resources

See also No. 2185.

2649. HORKY, A. Ergebnisse der Waldstandsaufnahme. **[Results of the [Austrian] forest survey.]** *Öst. Vjschr. Forstw.* 99 (2), 1958 (65–81 + 1 set of dgms.). [G.]

A general discussion of methods, results to date, future work proposed, and conclusions as to forest policy, etc. The latter centre on the needs of small farm forests, and include a proposal for the formation of 'sustained yield units' on (roughly) parish level, for which permissible annual cuts could be prescribed.

2650. Statistiska uppgifter rörande skogstillgångarna i de nordiska länderna. **[Statistics regarding Scandinavian forest resources.]** *Svenska SkogsvFören. Tidskr.* 56 (3), 1958 (251–65). [Sw.*e.*]

Contains tables of *per capita* and total forest area, ownership, growing stock and annual increment by species, for Denmark, Norway (5 regions), Sweden (5) and Finland (7) presented to the 9th Scandinavian Forestry Congress at Stockholm 1958, based, except for Denmark, on figures from state forest surveys.

2651. GALLANT, M. N. **Report to the Government of Liberia on the timber production potential of Liberia.** Expanded Technical Assistance Program, FAO, Rome. *FAO Report* No. 952, 1958. pp. 48.

2652. WEBSTER, H. H., and STOLTENBERG, C. H. **The timber resources of New Jersey.** Northeastern Forest Experiment Station, Upper Darby, Pa. 1958. pp. 40 + 1 map.

Provides survey data on the annual cut (by assortment), net growth and mortality in 1955, and the volume of growing stock by species and ownership class. The timber output in relation to requirements is discussed and silvicultural measures for improving the condition of the forests are suggested.

2653. Bosques cultivados en la Argentina. **[Plantations in Argentina.]** *Bol. argent. for.* 15 (152), 1957 (15). 1 ref. [Span.]

Tabulates the areas planted in 21 provinces. The total is 187,230 ha., of which 67% is in the Paraná delta (Buenos Aires and Entre Rios), with 75,000 ha. of Poplar and Willow. Next in order are Rio Negro, Mendoza and Misiones with 9, 6 and 5%. The ratio of Salicaceae, Eucalypts, conifers (mainly Parana Pine) and others is roughly 100/12/7/14, conifers being notably deficient for the country's needs.

91. Land Use, Land-Use Policy (including Afforestation Policy

See also Nos. 1619, 2634, 2661.

2654. GOSWAMI, P. C. **Forest policy for the Damodar valley.** *Indian For.* 84 (9), 1958 (539–48). 16 refs.

Examines the present state of the valley, and concludes that protection and proper management of the existing forests should be the main aim of forest policy there, especially as $> 2\%$ of the total area of the Upper Valley is expected to be available for afforestation.

2655. WYATT-SMITH, J. **Shifting cultivation in Malaya.** *Malay. Forester* 21 (3) 1958 (139–55 + 4 photos). 24 refs.

Reviews the problem, showing that though 73% of the land surface of Malaya is still under forest, there is no room for complacency, since excessive damage to economic forest already exists. The early permanent settlement of the aborigines is urged. *From author's summary.*

2656. JOHNSON, V. E. **Land use in Canada.** Canadian International Paper Co., Montreal. [1958.] pp. 40.

An account of the encouragement of 'tree farming' [dedication of private land to the production of timber crops] by the International Paper Co., in order to ensure pulpwood supplies for its mills and at the same time control erosion and soil degradation in Quebec.

2657. Enquête sur la place de la forêt dans l'utilisation des sols. Note du Secrétariat. **[The place of forests in land use. Secretariat report.]** [*Docum.*] *6th Sess. FAO Latin Amer. For. Comm., Guatemala 1958* No. *FAO/LAFC* 58/33, 1958. pp. 9. [F.] Limited distribution.

Reviews briefly and discusses 4 recognizable zones in the whole of Latin America, (1) with superabundant forests, (2) with forests in equilibrium with other vegetation types, (3) with insufficient forests, and (4) totally devoid of forests.

2658. STEIN, H. A., and LIZANO, P. L. Grupo de trabajo sobre el fomento forestal a largo plazo. (Primera reunión). Lugar que ocupa el bosque en la utilización de los suelos en Costa Rica. **[Working party on long-term forest improvement. (First meeting.) Part played by the forest in the utilization of the soils in Costa Rica.]** [*Docum.*] *6th Sess. FAO Latin Amer. For. Comm., Guatemala 1958* No. *FAO/LAFC*-58/33 *Suppl.* 1, 1958. pp. 18 + 1 map. [Span.] Limited distribution.

Discusses 3 types of area:—(1) over-forested, (2) with forests in land-use equilibrium with other vegetation, and (3) under-forested, and reviews the use made of the soils for agricultural and other purposes and the degree of exploitation of the forests.

2659. BLANCO MACÍAS, G. Conservación. Recursos renovables: Base fundamental de un programa de Gobierno. **[Fundamentals for a government programme for renewable resources [in Mexico].]** *Mensajero for., Durango* No. 165, 1958. (15 . . . 21). [Span.]

2660. Necesario fomento de la forestación. **[Essential aid for [private] planting.]** *Bol. argent. for.* 15 (152), 1957 (9–12). [Span.]

Argues, in detail, with supporting data, the plea of the forest producers' federation to the Argentinian Forest Commission for assistance and the removal of legal obstacles and taxation, which are shown to absorb 48·9% of the profit, leaving for the investor only 6·9% interest. Proposals are: exemption from or modification of 3 taxes; 4 types of credit facility; state-authorized co-operative insurance; exchange facilities for import of seed; assistance in increasing the mechanical pulping of Poplars and Willows. Argentina's annual consumption of wood is 2,427,000

cu.m., of which 1,150,000 represents pulp, a figure that should be doubled. *Araucaria* yields, by the 11th year, 200 cu.m./ha., of pulpwood, and by the 33rd, 385 cu.m. of timber. The total planted area should be increased at the rate of 6000 ha./year to 105,600. Only 2000 ha. of the annual planting should be done in Misiones, an area of poor communications and high freights which already has 6000 ha. of plantations. In the Delta, nearer consuming centres, the balance of 4000 ha. should be planted to conifers.

92. Forest Ownership and Ownership Policy

2661. **Royal Commission on common land 1955–1958; Report.** H.M. Stationery Office, London. Cmnd. 462, 1958. pp. viii + 284 + 17 photos.

The terms of reference of the Royal Commission were 'to recommend what changes, if any, are desirable in the law relating to common land in order to promote the benefit of those holding manorial and common rights, the enjoyment of the public, or, where at present little or no use is made of such land, its use for some other desirable purpose'. Woodland reclamation and improvement is one of the subjects dealt with.

2662. ECKERT, E. Die Bedrohung der staatlichen Forstwirtschaft durch gesamtwirtschaftliche Strukturänderungen. **[The threat to State forestry through structural changes in the national economy.]** *Forstarchiv* 29 (8), 1958 (169–78). 8 refs. [G.]

Stresses the necessity of increasing the profitability of the State forests of Lower Saxony and proposes a reorganization of the existing financial arrangements, introducing improved accounting methods etc., and a system of annually varying credits that would allow the forest department to participate in the profits (both net surpluses and real net profits). Other recommendations include simplification of working plan inventories and a wider application of the sustained yield principle to embrace the state forests as a whole, not merely individual forest districts, thus permitting extensive overmature Beech stands in Lower Saxony to be replaced by fast-growing species, especially conifers.

93. Public Supervision and Regulation of Forestry, including Legislation for these Purposes

See also No. 2629.

2663. **Spain: new Forestry Act, 8 June 1957.** In *Food agric. Leg.* 7 (1), 1958. pp. 21. [E.] (Translated extracts from *Boletín Oficial del Estado* No. 151, 10 June 1957.)

2664. CHAPMAN, G. W. **On the regulation or extinction of rights of usage.** [*Docum.*] *2nd Sess. FAO Near East For. Comm., Rome 1958* No. *FAO/NEFC*-58/18, 1958. pp. 11. Limited distribution.

2665. DAVIDSON, D. F. **The effect on local and national economies in the Near East on the rights of usage practised on lands not under permanent agriculture.** [*Docum.*] *2nd Sess. FAO Near East For. Comm., Rome 1958* No. *FAO/NEFC*-58/17, 1958. pp. 10. Limited distribution.

2666. BELLEFONDS, Y. L. DE. **An analysis of Koranic law dealing with possession of land and rights of individuals to use it, of the historical Turkish land law of 1858, and their compatibility with the general principles for dealing with rights of usage.** [*Docum.*] *2nd Sess. FAO Near East For. Comm., Rome 1958* No. *FAO/NEFC*-58/16, 1958. pp. 13. Limited distribution.

94. Other Methods to Implement Forest Policy

See also No. 2660.

944. Co-operation. Collaboration of Forest Owners

2667. SHIMOTORI, S. **[Management consciousness among forest small-holders.]** *For.* (*industr.*) *Econ., Tokyo* 11 (9), 1958 (33–45). [Jap.]

A detailed case-study of a single village (Otonemura Sorachi-gun) in central Hokkaido, having slightly more than half its land (viz. 6215 chos) under forest and 25% of this communally owned. The relations between the village forest co-operative and forest service officials are described; there is no formal working plan but some management guidance and technical instruction are given.

945.3. Education. Training. (Including Educational Tours and Information on Careers.)

2668. SAW TUN AUNG, U. **Special management and inventory course at the Imperial Forestry Institute, Oxford, England.** *Burmese For.* 8 (1), 1958 (6–25).

2669. KERNAN, H. S. **Forestry education in Spain.** *J. For.* 56 (10), 1958 (765–6).

A brief review.

2670. **Forestry education. Note by the secretariat.** [*Docum.*] *6th Sess. FAO Latin Amer. For. Comm., Guatemala 1958* No. *FAO/LAFC* 58/31, 1958. pp. 5. [E.] Limited distribution.

A review of the present situation in Latin America as a whole.

2671. Agronomía—número especial dedicado al quinto aniversario de la carrera de ingeniería forestal. **[*Agronomía*—special number devoted to the fifth anniversary of professional forestry [in Chile].]** *Agronomía, Santiago* 2 (4), 1957. pp. 28. [Span.]

This special commemorative number includes the following articles: Five years of forestry at the University of Chile (*H. Valenzuela R.*); Planning for *Pinus radiata* (*R. Silva Muñoz*); Management problems in the national forests of Chile (*M. R. Ortiz Cespedes*); and Possibilities of introducing Cork Oak into the semi-arid zone of Chile (*H. Lisboa B.*).

945.4. Research

See also Nos. 2233–4, 2547–9.

2672. Arbeitsbericht für den Zeitraum vom 1. April 1955 bis 31. Dezember 1957. **[Report for the period 1 April 1955–31 Dec. 1957.]** Bundesforschungsanstalt für Forst- und Holzwirtschaft, Reinbek bei Hamburg. [1958]. pp. 35. Many refs. [G.]

Contains reports on the research programmes of the sections, with lists of their publications, a list of the staff, of the lectures given by the staff at Hamburg University, theses and diploma essays submitted, activities of the library and documentation section, etc.

2673. MARION, J. Un exemple spectaculaire de développement régional des ressources en bois: la politique de production ligneuse de la Société Cartiere Burgo dans la Vallée du Pô. [**A spectacular example of regional development of timber resources: the wood-production policy of the Cartiere Burgo company in the Po valley.**] Le Feuillu Français de Papeterie, Paris. 1958. pp. 20. [F.]

Gives an account of the foundation, by a commercial firm (the Cartiere Burgo), of the Istituto di Pioppicultura at Casale Monferrato for research into Poplar cultivation in N. Italy, the results of research to date, and the economics of Poplar growing for pulp production.

2674. EREN, T. Fondation et travaux de l'Institut de Populiculture pour la Turquie et le Proche-Orient. [**Foundation and programme of work of the Poplar Institute for Turkey and the Near East.**] [*Docum.*] *14th Sess. stand. exec. Comm. int. Poplar Comm., Rome 1958* No. *FAO/CIP/CP*/19, 1958. pp. 9. [F.]

Describes the progress made at the site of the future institute at Izmit, including planting work completed, and future plans, listing the Poplar varieties available at the experimental nurseries at Izmit and Ankara as 1- and 2-year-old plants and 1-year cut-back rooted cuttings.

2675. Rapports d'activité des Commissions nationales pour l'année 1957. [**Progress reports of the National [Poplar] Commissions for 1957.**] [*Docum.*] *Int. Poplar Comm.* Nos. *FAO/CIP*/93 *B-L & O*, 1958. pp. 4 + 7; pp. 7; pp. 22; pp. 2; pp. 4; pp. 7; pp. 6; pp. 12; pp. 13; pp. 10; pp. 2; pp. 4. [F.]; Nos. *FAO/CIP*/93 *A*; *M*; *N*, 1958. pp. 7; pp. 3; pp. 1. [E.] Limited distribution.

Switzerland; Spain; Italy; Austria; Greece; Turkey; Morocco; Jugoslavia; Germany; France; Lebanon; Syria; United Kingdom; Argentina; and Sweden.

2676. CLAUDOT, M. J. Compte rendu des activités des équipes nationales. Maroc. [**Progress reports of national working parties. Morocco.**] [*Docum.*] *3rd Sess. Wkg. Party on Eucalypts FAO Jt. Subcomm. Medit. For. Probl., Madrid 1958* No. *FAO/SCM/EU/12F*, 1958. pp. 4. 1 ref. [F.] Limited distribution.

Notes on species trials, including irrigated trial plantations of *Eucalyptus gomphocephala* and others, showing promise for shelterbelts for irrigated crops.

2677. BLANCO MACÍAS, G. El Instituto Nacional de Investigaciones Forestales. [**The National Forest Research Institute [of Mexico].**] *Mensajero for., Durango* No. 167, 1958 (6–7, 30). [Span.]

Gives details of the field to be covered by this new institute (inaugurated Aug. 1958 at Coyoacan), which begins its work with departments of [wood] technology, genetics, silviculture and soil, National Forest Inventory, insects and pathology, a library, and a demonstration and conference hall.

2678. El Instituto de Investigaciones Forestales de la provincia de Buenos Aires, Argentina. [**The Forest Research Institute of Buenos Aires province, Argentina.**] *Rev. for. argent.* 2 (3), 1958 (103–4). [Span.]

Short notes on the Instituto de Investigaciones Forestales 'Martin Pereyra Iraola', which was set up in 1956, its organization and the work in progress.

95. Forest Taxation

See also No. 2660.

2679. VINEY, R. La contribution foncière de la propriété forestière. [**The land tax on forest property [in France].**] *Rev. for. franç.* 10 (10), 1958 (647–57). 6 refs. [F.]

2680. El aspecto impositivo y la actividad forestal. [**Taxation and forestry [in Argentina].**] *Bol. argent. for.* 15 (151), 1957 (4). 1 ref. [Span.]

Quotes clauses of the income-tax law covering exemptions for investment in plantations and reductions for products intended for further manufacture, the taxing of forest concessions, and exemptions of plantations and certain forests from real-estate duty, and lists forest products not further processed than for protection (barking and seasoning) as not subject to sales tax.

97. International Forest Policy and Other International Collaboration

971. Congresses, Conferences

See also Nos. 2550, 2554, 2568, 2573.

2681. **Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957. Summary report, resolutions, and reports of committees.** Government Printer, Canberra. 1957 [1958?]. pp. 83. Price 10*s*.

2682. **Report of the 4th Session of the Asia-Pacific Forestry Commission, Bandung, Indonesia 8–21 June 1957.** FAO, Rome. 1958. pp. 74.

2683. Grundzüge einer europäischen Forstpolitik. [**The main lines of a European forest policy.**] *Holz-Kurier, Wien* 13 (39), 1958 (3–4). [G.]

A brief report on a meeting of the 5th Commission (Private and Communal forests) of CEA in Vienna, Sept. 1958, including lectures on: The impact of state measures of private forestry (*Speer*); Mutual influences of agriculture and forestry (*M. R. Courregelongue* and *O. Näri*); The impact of the Common Market and the Free Trade Area on the forestry of the CEA countries (*L. Moser*) etc.

972. Organizations

2684. SCHWARZ, H. Internationale Forstpolitik. [**International forest policy.**] *Öst. Vjschr. Forstw.* 99 (2), 1958 (81–96). [G.g.]

Mainly a discussion of the tasks of the Forestry Division of FAO (*A*) and its many ramifications, including joint groups with ECE and IUFRO, but also of the Special Commission for Private and Communal Forests (*B*) formed in 1951 by the *Confédération européenne de l'Agriculture* (CEA). The policy statements of (*A*) and (*B*) are reproduced [in German] as also the German and English texts of Section 9 of the Oxford System.

FORESTRY THE WORLD OVER

References: 1. *Allgemeine Forstzeitschrift*, Munich; 2. *Board*, London; 3. *Fire Protection*, London; 4. *Forestry Commission Press Release*, London; 5. *Forêt-Conservation*, Quebec; 6. *German View*, London; 7. *Holz-Kurier*, Vienna; 8. *Holz-Zentralblatt*, Stuttgart; 9. *Lesnoe Hozjajstvo*, Moscow; 10. *Lumberman*, San Francisco; 11. *New Zealand Forest Service Newsletter*, Wellington; 12. *Pulp & Paper Magazine of Canada*, Gardenvale, Quebec; 13. *Revue Internationale du Bois*, Paris; 14. *Skogen*, Stockholm; 15. *Southern Lumberman*, Nashville, Tenn.; 16. *Timber & Plywood*, London; 17. *Timber of Canada*, Toronto; 18. *Unasylva*, Rome; 19. *Wood*, London; 20. *Woodworking Industry*, London.

International Conferences

1959	**FAO**	
3–15 April	*Ad hoc* Study group of experts on wood utilization.	Geneva
Sept.–Oct.	World Pulp & Paper Consultation.	Rome
	Other	
7–9 May	1st World Congress of Agricultural Research.	Rome
9–11 June	International Convention on Seed Testing	Oslo
19–29 Aug.	9th International Botanical Congress.	Montreal
9–10 Sept.	2nd International Congress on Air Pollution.	New York
1960		
11–12 July	8th International Grassland Congress.	Reading, England
15–20 Aug.	7th International Congress of Soil Science	Madison, Wis.
17–25 Aug.	11th International Congress of Entomology	Vienna

Abyssinia. The Forest Department in the Ministry of Agriculture has been reorganized, and a new building to house it is under construction. An Imperial Forest Service consisting of forest conservatorships in the 13 provinces is being developed. A forest rangers' school has been founded in conjunction with the agricultural college at Ambo, and a forest research institute is under construction. Professor F. Heske has been appointed Director General of the Forestry Department (**18**; Dec. 1958).

Austria. A 'plastic' floor covering installed, for testing, in the Institut für Holzforschung, Vienna, produced such high charges of static electricity in persons walking on it that the touching of metal objects, taps, etc. became distinctly unpleasant and work with inflammable material impossible. It was possible to light a gas jet by snapping one's fingers (**7**; 12.2.1959).

Canada. A perfectly straight Douglas Fir, 370 years old and 255 feet long, was selected by the forest industry of British Columbia as its Centennial Year gift to the people of the United Kingdom. After being felled the stem was cut to a length of 226 ft., loaded on false bunks on top of two loaded logging trucks, and delivered to a beach 25 miles away, where it was dumped in the water and towed to Vancouver Harbour. Two floating cranes loaded the 36-ton log abroad a freighter, where it rested on a deck-load of lumber bound for the port of London. There it was dumped into the Thames and towed up the river to Kew for dressing and seasoning. When erected as a flagpole in the Royal Botanic Gardens at Kew, it will be the tallest flagpole in the world (214 ft., above ground) (**18**; Dec. 1958).

The resilience of wood, which enables it to withstand impact shocks and sudden overloads far in excess of normal design requirements, is unequalled by other materials and was put to good use during the installation of the 20,000-lb.-capacity universal testing machine in the new Vancouver Laboratory of the F.P.L. of Canada. A cushioning pad of 2-in. Oak planks was placed between the machine and its concrete base to prevent possible damage to the concrete by shock transmitted from the testing machine. The bearing strength of the Oak planks in compression is adequate to support the weight of the machine, while their resilience successfully absorbs vibratory and impact shocks (**19**; Sept. 1958).

The Canada Paper Company has recently completed at its Windsor Mills plant an installation for continuous burning of bark, serving at once to provide steam for the mill (600,000 lb./24 hr., with a

pressure of 220 lb./sq. in.) and to eliminate the problem of bark disposal. The bark is deposited by the barkers on to perforated draining plates, conveyed to a heavy press where the remaining moisture is removed, and again by conveyors to the furnace, into which it is fed by gravity. An auxiliary oil-burning furnace ensures continuous production of steam in case the supply of bark should fail. The total cost of the installation was ca.$300,000 (**5**; Dec. 1958).

A steadily-growing, 20-year accumulation of 17 million cu. ft. of bark and wood refuse covering 400,000 sq. ft. at the Three Rivers Mill will no longer cause concern to the owners, the St. Lawrence Corp. Ltd. With the aid of a specially designed installation, the bark is now being processed and used as fuel to provide power for parts of the mill. The installation needs only five men per shift to operate it, and its capital cost (ca. $1 million) should be written off in 10 years (**12**; Jan. 1959).

Of 3 cords of Poplar and 2 of Spruce and Balsam left piled neatly in 4-ft. lengths on the banks of a tributary of the Bridgeland River near Thessalon, Ontario, all the Poplar disappeared in 3 days. The missing wood has been discovered 200 yards downstream at a beaver house and dam, taken by night, and sunk and stored for winter use, Poplar bark being the staple and preferred food of the beaver (**17**; Jan. 1959).

China. A recent specialist conference on desert reclamation reviewed the progress made under the present régime. So far, 1·4 million ha. have been afforested, 3·3 million ha. transformed into pasture, and 63,000 ha. cultivated by means of a new system of irrigation. In addition, 933 ha. of sand dunes have been re-covered with arable soil. The principal part of the immediate programme is concerned with tree planting and establishment of pastures (**13**; Dec. 1958).

Europe. The Conféderation Européenne des Industries des Bois (comprising the wood industries of Austria, Belgium, France, W. Germany, Great Britain, Italy, the Netherlands and Spain) have formed an international court of arbitration for disputes between woodworking firms (**8**; 26.2.1959).

Germany. Plans for a national nature reserve in the Pfälzer Wald have now been completed. Covering an area of 645 sq. miles, this will be the largest forested reserve in the Federal Republic. The centre of the reserve, at an altitude of 1300–2000 ft., is completely wild and uninhabited. Look-out towers, huts and hostels are to be built and trails cut (**6**; 13.2.1959).

The efforts to raise the skill and status of forest workers in Nordrhein-Westfalen have been very successful. Of the 7000 workers permanently and regularly employed, 5000 have now passed examinations qualifying them as trained forest workers (**1**; 7.2.1959).

A new type of pyramid-shaped mobile dwelling, for holiday use, military camps etc., which is now under test, consists of triangular wooden frames suspended from a central steel pole and fastened to steel poles in the corners, tent-fashion. Its combined roof-and-wall coverings are made of particle board, plasterboard, or soft bitumen-impregnated fibreboard, strengthened and made weather-proof by a synthetic-resin finish (**8**; 28.2.1959).

Great Britain. Abertillery local council has agreed to assist the Forestry Commission financially in a scheme for planting trees on a colliery tip, the site of which has been made over to the Commission by the National Coal Board (**16**; 5.2.1959).

Unsurfaced tracks into forest areas and timber yards, which in wet weather rapidly become a sea of mud, can be turned into semi-permanent roadways by a simple new British material known as Trakmat. The product, which is patented, consists of Chestnut pales sandwiched between two layers of high-tensile steel mesh, and is a cheap development of the material used to construct advanced airstrips for the R.A.F. in wartime. Trakmat will support loads up to 10 tons when laid flat on very soft ground or even sand, and if suitably staked will support a 3-ton lorry across a narrow culvert. An incidental advantage is that the material has a scraping effect on the wheels of rubber-tyred vehicles and removes much of the mud that would otherwise be carried on to the road. The square-mesh upper and lower sheets of the Trakmat units take the tensile load and the Chestnut pales between them serve as spacers and thereby increase the moment of inertia for bending about a horizontal axis. The pales are strong enough to take the direct compressive loads and, moreover, have sufficient surface area to prevent the unit from sinking into the ground. Details of costs, sizes etc. can be obtained from Bracketing, Centering & Lathing Ltd., Central Avenue, West Molesey, Surrey (**4**; Jan. 1959).

The use of Land Rovers equipped with walkie-talkie sets and a more powerful, police-type transmitter for fire prevention work, preparations, and practice, continues in the adjacent forests of Dunster and Brendon (Somerset). Other fire precautions at Dunster include a watch-tower and a reservoir at 1200 ft. alt., filled by a spring. The reservoir was made by excavating a pit and laying a thin concrete

skin direct on the soil. On Oct. 1st, 1958, Dunster Forest (formerly managed by the Forestry Commission) reverted to its owners, the Crown Estate Commission, ownership and management of Brendon Forest being retained by the Forestry Commission (**3**; Jan. 1959).

The new scheme of sorting and grading timber in 4 grades (1—high-class joinery timber, 2—standard joinery wood, 3—building timber, and 4—packing-case specification), conceived in 1956 by the English Joinery Manufacturers' Association to ensure optimum suitability and minimum wastage, was tested in 1958 on a sample shipment of 100 standards of Swedish softwood. It was found little better than the traditional system of grading, since the differences in quality between the grades were not sufficiently marked to establish clear dividing-lines between the requirements of the various users (**20**; Feb. 1959).

Greenland. Following unsuccessful attempts at afforestation with Canadian and Norwegian conifers, trials are now being made with Siberian dwarf Larch, 40,000 of which have been planted after intensive soil preparation, involving not only ploughing but also the addition to the soil of imported humus (**7**; 29.1.1959).

Hungary. Hungary's first fibreboard factory was expected to be ready for test production at the beginning of 1959. It is believed to be unique in that its raw material will be Willow and Poplar. Hungary has little coniferous waste wood, so attention has been turned to the Willows and Poplars that are plentiful along the main waterways. The plant is being built beside the Danube at Mohacs. Wood from the banks of the Danube, transported downstream in barges, is expcted to keep the factory going for many years. Poplar will be obtained by thinning the plantations, removing trees up to 4-in. diam. Output of the factory will start at 12,000 tons a year, rising to 62,000 tons by 1962 (**2**; Sept. 1958).

New Guinea. The giant shellback snails introduced by the Japanese during the war are still a very destructive pest in some parts of the island. It is often necessary to replant with young Coconut trees a dozen times, and the snails also do great damage to young Cacao. The planters used poisoned snail-baits, but they cost up to 2½*d.* each, and thousands are called for. The Planters' Association is now supplying snail-baits at cost price (**11**; Dec. 1958).

A question was raised recently in the Legislative Council concerning the relationship between the afforestation that is now proceeding and the rate at which Hoop and Klinki Pines are being cut in the high country of the mainland. The opinion was expressed that as plywood is now going out from Bulolo at the rate of 28 million sq. ft. a year, the available Pine will be exhausted long before the expiry of 50 years, when the newly planted Pines will be ready for cutting (**11**; Dec. 1958).

Norway. On Feb. 2, 1959, new buildings for the study of various subjects, including forest mycology and microbiology, were opened at Ås, south of Oslo, under the joint auspices of Det norske Skogforsøksvesen and Norges Landbrukshøgskole. They are to house existing institutions covering plant protection, seed testing and control, microbiology, forest damage, game research and freshwater fisheries (**14**; 20.2.1959).

Portugal. The new Six-year-Plan (1959–65) provides 750,000 contos (ca. $2½ million) for forestry. More than half of this amount is to be invested in afforestation, carried out by the Forest Administration on > 100,000 ha. This State afforestation programme is expected to be supplemented by planting by private landowners, benefiting by the special facilities granted by a law of 24 April 1954. This law provides exemption from taxes, preferential credits, facilities for the supply of seeds and plants, and free technical assistance for owners of land where afforestation is considered indispensable for soil conservation; under its provisions a total of 81,000 ha. is expected to be afforested. Ca. 20% of the total forestry investment is to be devoted to supplementary works—roads, buildings, telephone lines, meteorological stations etc. (**18**; Dec. 1958).

Sweden. An installation using television for the sorting of floated roundwood is being set up on the Ångerman River, in W. Norrland. The operator, sitting in a covered cabin, will be able to recognize the markings of the various owners on the screen and to direct the items to the right sorting ponds by means of a button-operated automatic sorting device. A system for automatic scaling may also be incorporated (**7**; 29.1.1959).

U.S.A. Preliminary tests on the location and duration of high temperatures in a typical wooden frame house in East Texas showed that, during a period of 20 days during which air temperature reached 100° F. on 3 days only, temperatures immediately under the roof were > 100° F. for 8 or 9 hours every day, and reached a maximum of 141°. In the glue line of a laminated interior wall, a temperature of > 100° was recorded only once, for ca. 1 hour. This is not considered alarming from the point of view of glue deterioration, but the roof situation may be, and forced ventilation and insulation are recommended (**15**; 1.1.1959).

The U.S. Plywood Corp. has made a 40,000-sq. ft. addition to its plywood plant at Orangeburg, S.C., to house a finishing production line that is the closest approach to complete automation in the industry. An 'electronic brain' controls the entire finishing process, consisting of 18 operations, including sap-stain obliteration, toning, baking to fix colour, sanding, filler application, lacquering, drying, and polishing. It takes 97 minutes for a panel to travel the full length of the 784-ft. production line, with 320 panels moving along the line at one time. The whole production line requires only seven workmen (10; Jan. 1959).

A new elastomeric-base adhesive for bonding plastics, steel, aluminium, and wood is said to have good water resistance, to retain strength and adhesion at > 200° F., and not to require either heat or pressure. Wood-to-wood shear strength is up to 300 lb./sq. in. after ageing for 5 days at room temperature. Producers are Adhesives, Coatings, and Sealers Division, Minnesota Mining and Manufacturing Co., Detroit, Mich. (**10**; Jan. 1959).

U.S.S.R. Near a village in the Kirov region, a 60-year Pine has been observed with a living Spruce branch growing from it at a height of 4 m. The Spruce branch is ca. 2 m. long and ca. 5 cm. in diameter near the trunk. On the opposite side of the trunk is a dead Spruce branch, 20 cm. long and 2 cm. in diameter, and a rotten Spruce stump was noticed very near the Pine (**9**; April, 1957).

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